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ABSTRACT

This annual report combines the November, January, April, June, and August provincial results in diploma examination courses in Alberta, Canada. The graphs, tables, and text describe student performance for the entire school year. The report is designed to assist school personnel in identifying patterns of student achievement in Alberta and monitoring the effectiveness of their programs in support of student learning. The Diploma Examination Program, established in 1984, certifies the level of individual student achievement in selected grade-12 courses and it helps ensure that province-wide standards of achievement are maintained. The program reports individual and group results. During the 1997-98 school year, final course grades show that, in all courses except Mathematics 33, more than 90% of students achieved the "acceptable" standard. A high percentage of students achieved the standard of excellence in Biology, Chemistry, Physics, and Mathematics 30. The report contains these sections: (1) "Grade 12 Diploma Examinations Program"; (2) "Summary of Results"; (3) "Results by Gender"; (4) "Results for Population Subgroups"; (5) "Special Study: Achievement-over-Time for the Multiple-Choice Section of the English 30 and Social Studies 30 Examinations 1989-1998"; (6) "Special Study: Achievement-over-Time for the Biology 30 Extended Written-Response Question (June 1995 and June 1998 Comparison)"; and (7) "Examiner's Annual Summary Statements." Three appendixes describe the examination development process, give guidelines for interpreting and using the program results, and show the percentage distribution of grades in diploma examination courses. (Contains 39 figures and 43 tables.) (SLD)

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ED 438 306

1997–98 School Year

Annual Report

Diploma Examinations Program

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Diploma Examinations Program

Alberta
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This document was written primarily for:

Students	
Teachers	✓
Administrators	✓
Parents	
General Public	
Others (Specify)	Researchers

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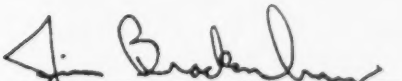
Message from the Director

Many teachers worked with Alberta Education during the 1997–98 school year, assisting with various aspects of the Diploma Examinations Program. Teachers helped with the development of exam questions, as well as field testing, administration, and the marking of the diploma exams. Superintendents, high school principals, and others in our school systems also helped make the examinations program work. We appreciate this assistance and the commitment of school districts to a high quality examinations program.

This annual report combines the November, January, April, June, and August provincial results in diploma exam courses. The graphs, tables, and text describe student performance for the entire school year. This report is designed to assist school personnel in identifying patterns of students' achievement in the province and monitoring the effectiveness of their programs in supporting student learning.

The Annual Report is also available on Alberta Education's home page (http://ednet.edc.gov.ab.ca). This supports our goal of providing information to Albertans about student achievement in this province. I hope that many Albertans will look at this report and find it of interest and value.



Jim Brackenbury, Director

Section 1

Grade 12 Diploma Examinations Program

Diploma examinations are administered in November, January, April, June, and August of each school year.

The Grade 12 Diploma Examinations Program, established in 1984, has three main purposes:

- to **certify** the level of individual student achievement in selected Grade 12 courses
- to **ensure** that province-wide **standards** of achievement are maintained
- to **report** individual and group results

The examination development process, described in Appendix A, ensures that this form of assessment provides valid and reliable results. Eleven Grade 12 courses have diploma examinations, and the seven below with an* are available in French translation:

- English 30
- English 33
- Social Studies 30*
- Social Studies 33*
- Français 30
- Mathematics 30*
- Mathematics 33*
- Biology 30*
- Chemistry 30*
- Physics 30*
- Science 30

This *Diploma Examinations Program Annual Report* provides province-wide results for the entire school year; that is, for the November, January, April, June, and August examinations combined. Additionally, the annual report provides summaries of results by gender and for population subgroups.

Findings on issues of topical interest related to the program are also featured. In the 1997–98 report, two achievement-over-time studies are presented.

Certification

A student's final mark in a diploma examination course is an equal combination of the examination mark and the school-awarded mark (except for students with mature status; see Section 4). For example, a diploma examination mark of 57% combined with a school-awarded mark of 45% would produce a final course mark of 51%, a "pass" in the course. This student would earn high school graduation credits for the course. The combining of the two marks to produce a final course mark recognizes the fact that the diploma examination assesses only those learning outcomes, listed in the *Program of Studies*, that can be effectively measured in a limited time using paper-and-pencil tests. The school can best assess students' achievement in such things in the laboratory, in research, in oral communication, and in cooperative learning.

Standards

The *Program of Studies* for each diploma examination course outlines what students are expected to know and to be able to do in order to pass the course. Information bulletins published at the beginning of the school year provide details about "how well" students are expected to do; that is, the bulletins outline the assessment standards for each diploma examination course. Students who achieve the *acceptable standard* of performance receive a final course mark of 50% or higher. Students who achieve the *standard of excellence* receive a final course mark of 80% or higher.

Reporting

The results achieved by students on the Diploma Examinations are aggregated at the school, jurisdiction, and provincial levels and are presented in this and the three reports described below. One of the purposes of the Diploma Examinations Program is to help school administrators, teachers, trustees, and Alberta Education evaluate the effectiveness of educational programs. Guidelines for interpreting and using these reports are given in Appendix B.

These reports should not be used as the basis for evaluating teacher performance or for comparing performance between schools or jurisdictions.

School and Jurisdiction Reports for each diploma examination course are made available electronically to superintendents and principals soon after the January and June administrations. These reports provide results at the question and sub-test level for each school and jurisdiction. This information is particularly useful in assessing the strengths and weaknesses of local programs. These reports are available to the public through the superintendent or principal, according to local board policy.

Examiners' Reports for each course, which are distributed after the January and June writings, are intended primarily for teachers. Provincial results are provided in relation to course standards as reflected in the examination blueprints and information bulletins.

Summary Results: Five School Years are provided electronically to schools and jurisdictions in September. These reports are used by jursidictions and schools to report to the public and are also available on the Alberta Education web site at http://ednet.edc.gov.ab.ca.

Section 2
Summary of Results

This section provides the overall results for the diploma examination courses.

The following questions will be answered:

- What percentage of students achieved the *acceptable standard* or the *standard of excellence* according to criteria set by Alberta Education?
- How many students wrote each diploma examination and how do these numbers compare with the previous two years?
- What was the average number of different diploma examinations written by each student in each course during the 1997–98 school year?
- What was the distribution of A, B, C, and F grades for each diploma examination course and how does this distribution compare with distributions of previous years?
- For each diploma examination course, what is the relationship between examination marks and school-awarded marks?
- Is the percentage of males and females who achieve the standards the same in each course?

What percentage of students achieved the *acceptable standard* or the *standard of excellence* according to criteria set by Alberta Education?

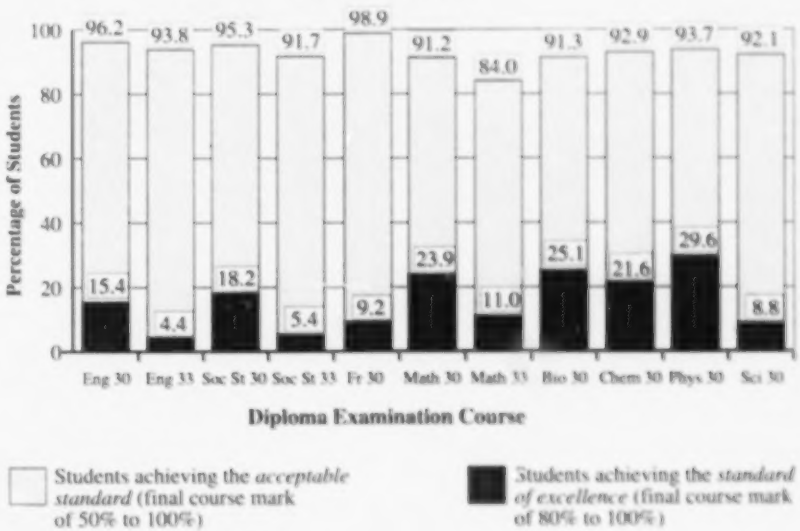
Figure 2-1 shows the percentage of students achieving the *acceptable standard* and the *standard of excellence* based on the final course mark. The "final course mark" is the average of the school-awarded mark and the diploma examination mark, or as otherwise provided by Alberta Education policy.

During the 1997–98 school year, final course marks showed that in all courses, except Mathematics 33, more than 90% of students achieved the *acceptable standard*. A high percentage of students achieved the *standard of excellence* in Biology, Chemistry, Physics, and Mathematics 30.

In Alberta, courses are selected by students according to their own needs, aspirations, and expectations. For this reason, local targets for the percentage of students expected to achieve the *acceptable standard* or the *standard of excellence* are best set in the context of local policies and conditions.

Figure 2-1

Percentage of Students Achieving Standards (Final Course Mark)
1997–98 School Year



How many students wrote each diploma examination and how do these numbers compare with the previous two years?

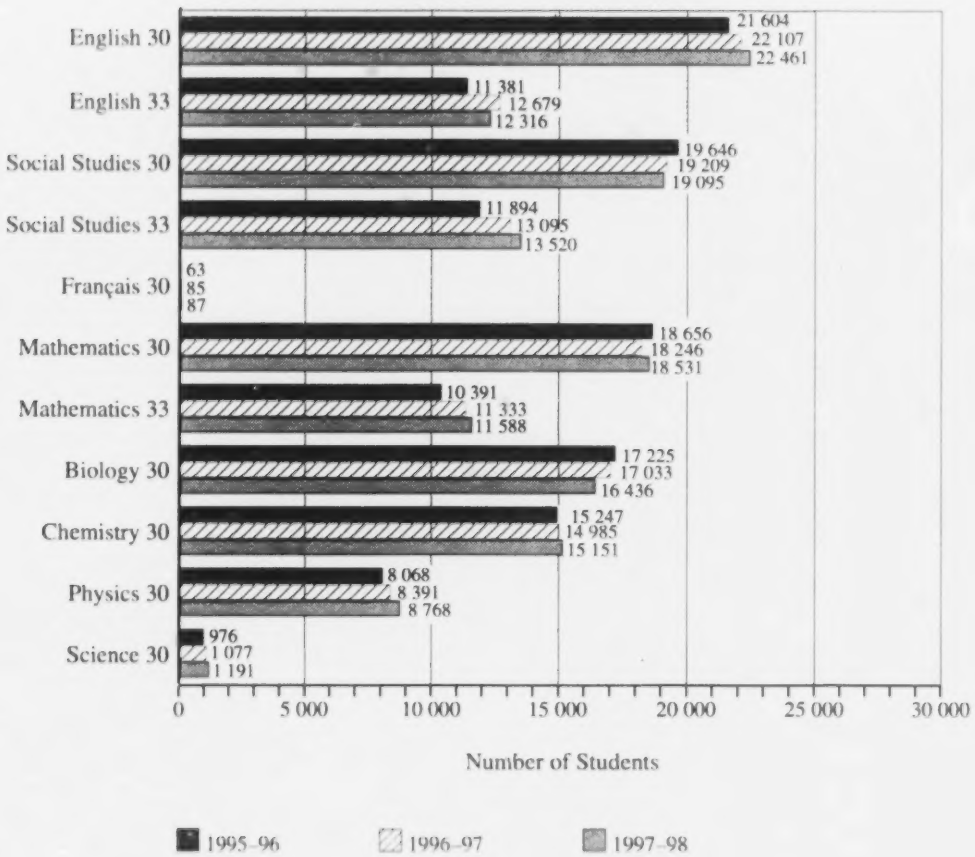
As shown in Figure 2-2, the number of students writing diploma examinations increased in 1997–98 for several courses, as compared with the previous year.

In 1997–98, the number of students writing diploma examinations in Social Studies 33, English 30, Mathematics 30, Mathematics 33, Chemistry 30, Physics 30, and Science 30 increased compared with the previous year.

Note: All students who wrote more than one diploma examination in a course during a single year are counted only once. Students who wrote examinations in the same course in different years are counted once in each year they wrote.

Figure 2-2

Number of Students with School-Awarded Marks Writing Diploma Examinations in Each Course
1995–96, 1996–97, and 1997–98 School Years



What was the average number of different diploma examinations written by each student in each course during the 1997–98 school year?

As shown in Figure 2-3, the average number of different diploma examinations written by students ranged from a low of 2.55 for students writing the English 33 examination to a high of 5.35 for students writing the Français 30 examination.

What was the distribution of A, B, C, and F grades for each diploma examination course and how does this distribution compare with distributions of previous years?

The distribution of A, B, C, and F grades for each course is shown in Figures 2-4 to 2-25.

There are two graphs for each course. The first shows the distribution for final course marks over the last three years.

The distributions remained relatively unchanged over time for all courses.

The second of the two graphs shows the 1997–98 school year distribution of A, B, C, and F grades for the school-awarded mark, the diploma examination mark, and the final course mark.

The number of Fs awarded to students for a final course mark is often lower than the number of Fs awarded for either the school-awarded mark or the diploma examination mark. One reason for this is that no final marks of 48% or 49% are awarded. If the average of the school-awarded mark and the diploma examination mark is 48% or 49%, the student is automatically given 50% as a final mark.

Figure 2-3

Average Number of Different Diploma Examinations Written by Students in Each Course 1997–98 School Year

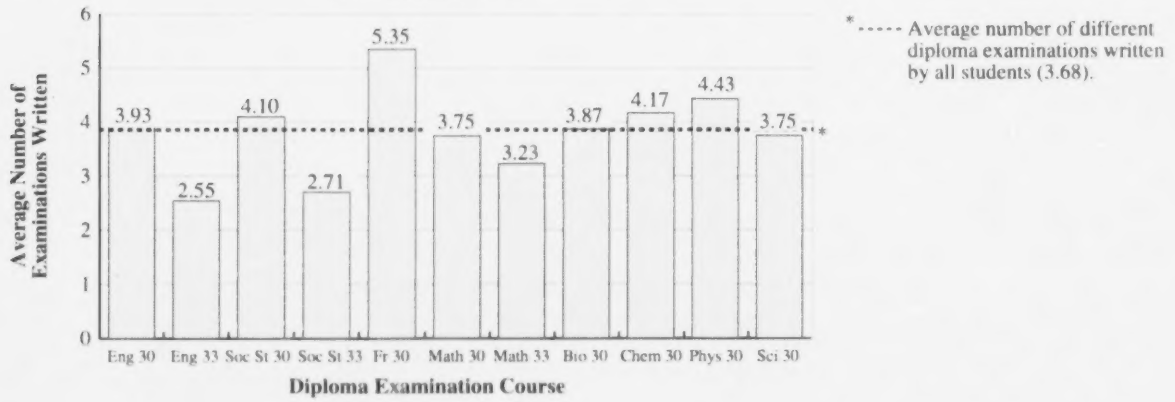


Figure 2-4

English 30
Distribution of A, B, C, and F for Final Course Mark Three School Years

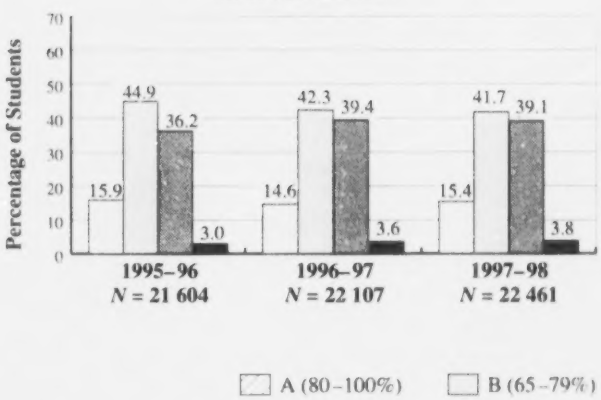
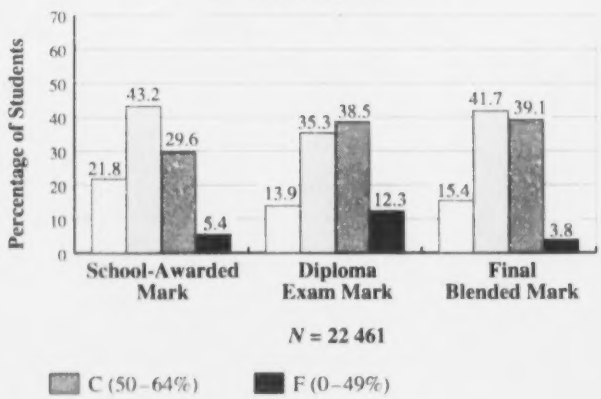


Figure 2-5

English 30
Distribution of A, B, C, and F for School, Examination, and Final Course Marks 1997–98 School Year



A (80–100%) B (65–79%) C (50–64%) F (0–49%)

Figure 2-6

English 33
Distribution of A, B, C, and F for Final Course Mark
Three School Years

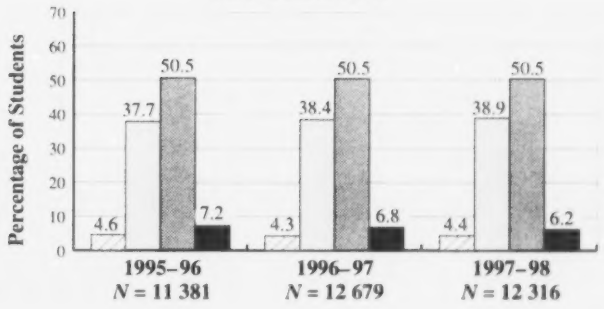


Figure 2-7

English 33
Distribution of A, B, C, and F for School, Examination, and Final Course Marks
1997–98 School Year

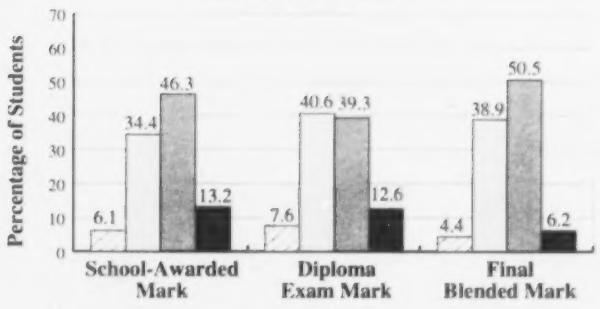


Figure 2-8

Social Studies 30
Distribution of A, B, C, and F for Final Course Mark
Three School Years

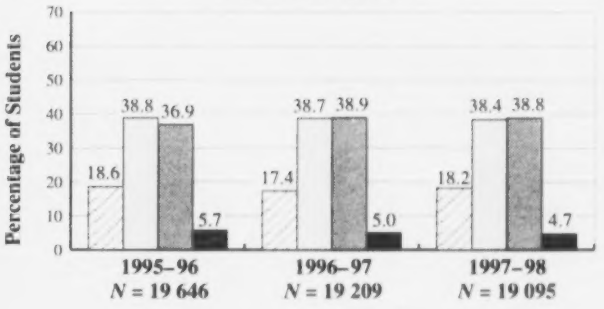


Figure 2-9

Social Studies 30
Distribution of A, B, C, and F for School, Examination, and Final Course Marks
1997–98 School Year

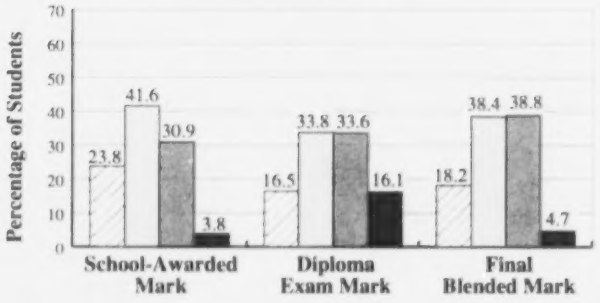


Figure 2-10

Social Studies 33
Distribution of A, B, C, and F for Final Course Mark
Three School Years

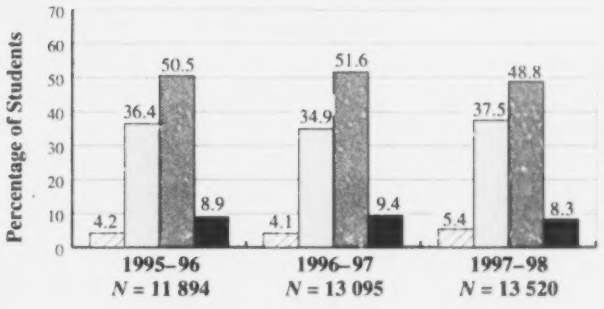
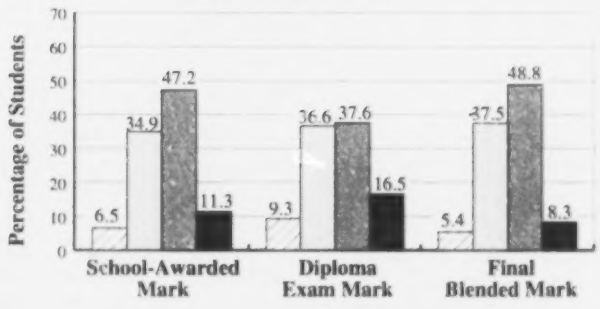


Figure 2-11

Social Studies 33
Distribution of A, B, C, and F for School, Examination, and Final Course Marks
1997–98 School Year



A (80–100%) B (65–79%) C (50–64%) F (0–49%)

Figure 2-12

Français 30
Distribution of A, B, C, and F for Final Course Mark Three School Years

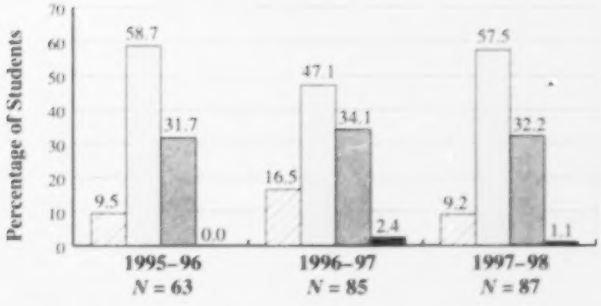


Figure 2-13

Français 30
Distribution of A, B, C, and F for School, Examination, and Final Course Marks 1997–98 School Year

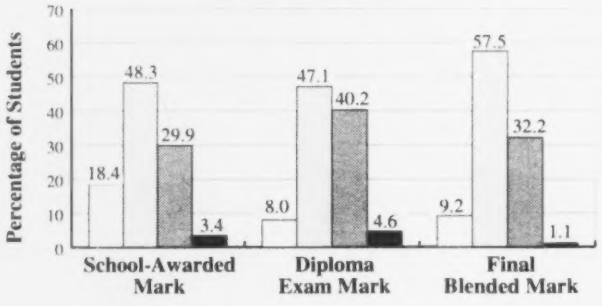


Figure 2-14

Mathematics 30
Distribution of A, B, C, and F for Final Course Mark Three School Years

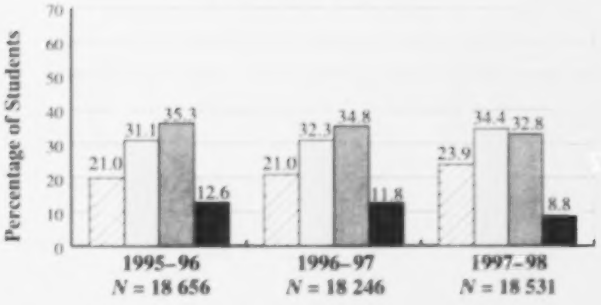


Figure 2-15

Mathematics 30
Distribution of A, B, C, and F for School, Examination, and Final Course Marks 1997–98 School Year

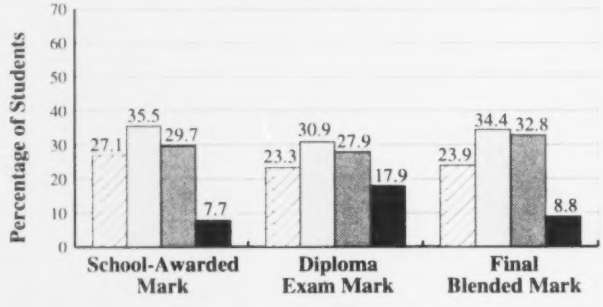


Figure 2-16

Mathematics 33
Distribution of A, B, C, and F for Final Course Mark Three School Years

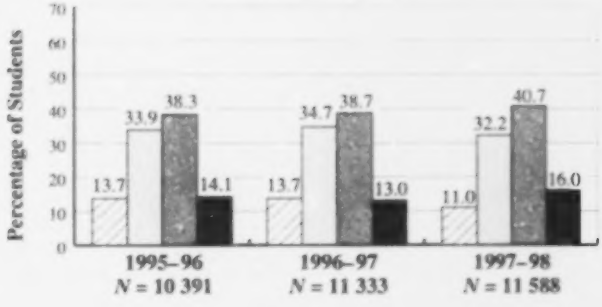
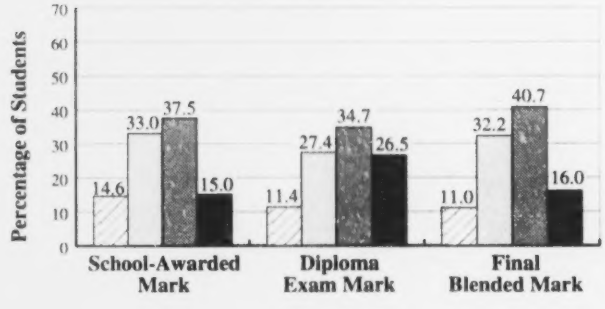


Figure 2-17

Mathematics 33
Distribution of A, B, C, and F for School, Examination, and Final Course Marks 1997–98 School Year



A (80–100%) B (65–79%) C (50–64%) F (0–49%)

Figure 2-18

Biology 30
Distribution of A, B, C, and F for Final Course Mark Three School Years

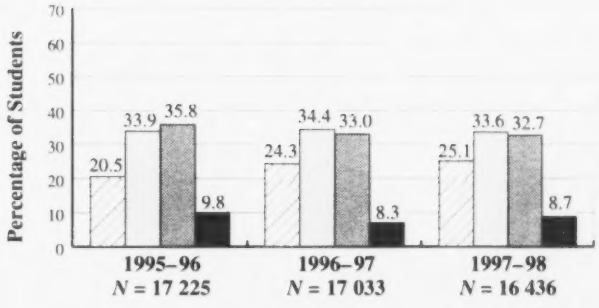


Figure 2-19

Biology 30
Distribution of A, B, C, and F for School, Examination, and Final Course Marks 1997–98 School Year

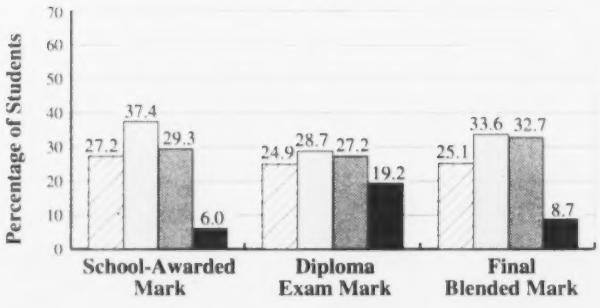


Figure 2-20

Chemistry 30
Distribution of A, B, C, and F for Final Course Mark Three School Years

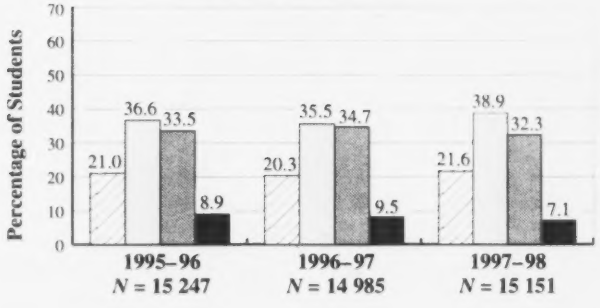


Figure 2-21

Chemistry 30
Distribution of A, B, C, and F for School, Examination, and Final Course Marks 1997–98 School Year

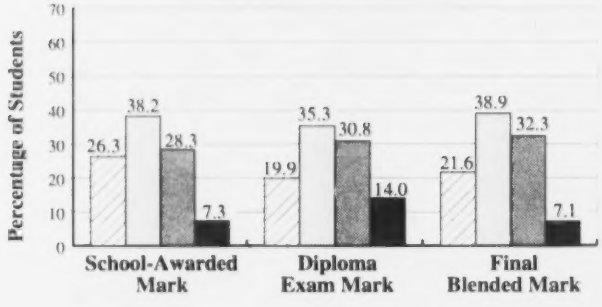


Figure 2-22

Physics 30
Distribution of A, B, C, and F for Final Course Mark Three School Years

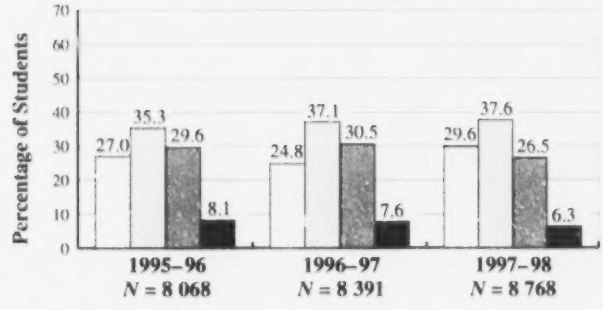
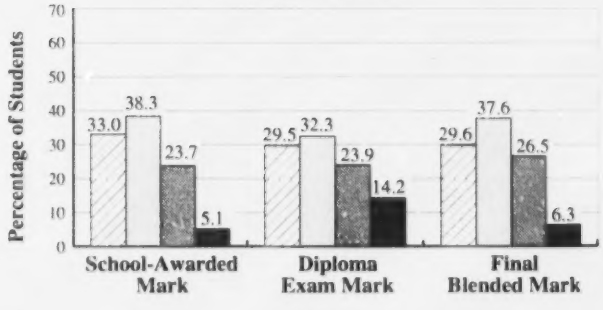


Figure 2-23

Physics 30
Distribution of A, B, C, and F for School, Examination, and Final Course Marks 1997–98 School Year



A (80–100%) B (65–79%) C (50–64%) F (0–49%)

Figure 2-24

Science 30
Distribution of A, B, C, and F for Final Course Mark Three School Years

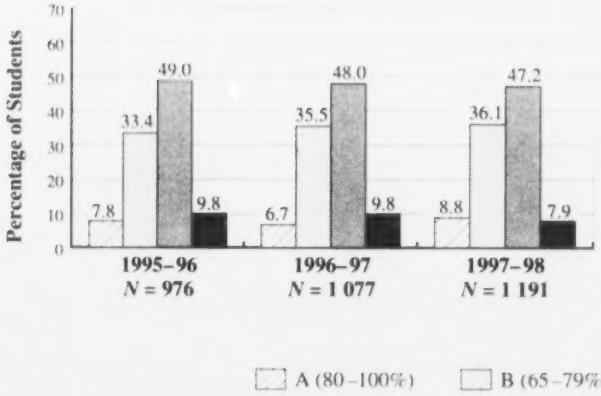
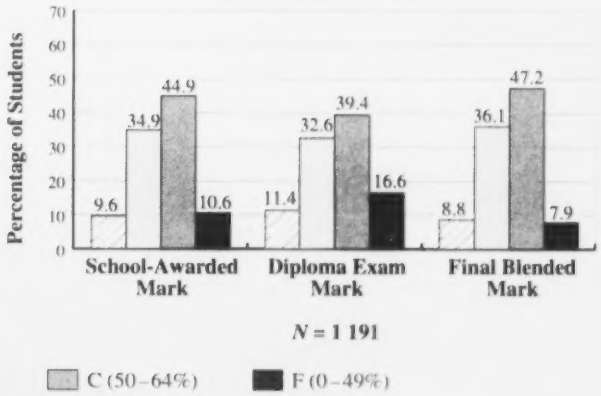


Figure 2-25

Science 30
Distribution of A, B, C, and F for School, Examination, and Final Course Marks 1997–98 School Year



A (80–100%) B (65–79%) C (50–64%) F (0–49%)

For each diploma examination course, what is the correlation between examination marks and school-awarded marks?

Table 2-1 presents the correlation coefficient between diploma examination marks and school-awarded marks for each diploma examination course. The maximum correlation coefficient is 1.0, which represents a perfect relationship.

The two marks represent separate assessments of achievement, each based on an overlapping yet different set of curricular objectives. To a large degree, these objectives are similar; however, there is a necessary degree of difference.

The diploma examinations are limited to measuring achievement of objectives that can be effectively assessed by paper-and-pencil tests. School assessments also measure achievement of additional objectives such as laboratory skills in the sciences, or speaking and listening skills in English. These correlations are expected to be positive and relatively high.

Factors that contribute to the less-than-perfect correlations include variations among teachers' assessment practices, the longer time span of school-based assessment, the effect of failure to complete assignments, and the individual student's approach to the different types of assessment.

Table 2-1

Correlation of Diploma Examination Marks and School-Awarded Marks by Course 1997–98 School Year

Course	Number of Students	Correlation Coefficient
English 30	22 461	0.614
English 33	12 316	0.395
Social Studies 30	19 095	0.746
Social Studies 33	13 520	0.520
Français 30	87	0.456
Mathematics 30	18 531	0.779
Mathematics 33	11 588	0.712
Biology 30	16 436	0.814
Chemistry 30	15 151	0.771
Physics 30	8 768	0.757
Science 30	1 191	0.626

Section 3
Results by Gender

This section of the report provides separate results for males and females. The following questions will be answered:

- What proportion of males and females write diploma examinations?
- Is the percentage of males and females who achieve the standards the same in each course?
- Are males and females awarded similar school marks? Is the pattern the same for diploma examination marks?

What proportion of males and females write diploma examinations?

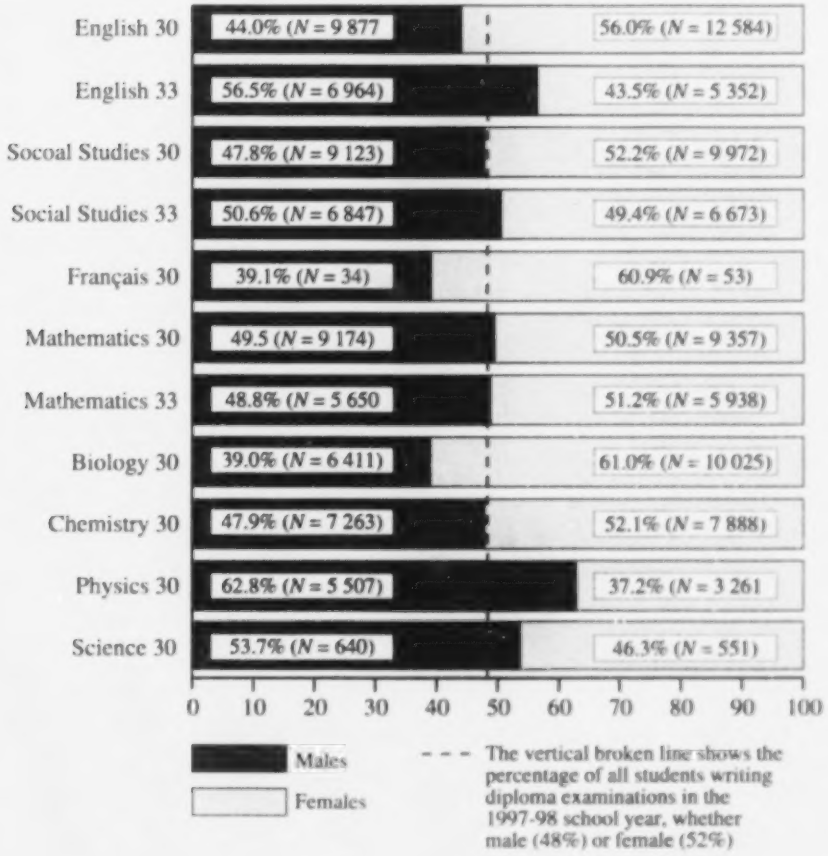
Of all students who wrote diploma examinations in the 1997–98 school year, 48% were male. Figure 3-1 shows that in the 1997–98 school year, fewer males than females wrote diploma examinations in all courses except English 33, Social Studies 33, Physics 30, and Science 30. The reasons for this underrepresentation of males among students writing most diploma examinations cannot be determined from the available data.

Schools and jurisdictions that wish to explore this relationship further could look at:

- the percentage of males and females seeking a high school diploma
- the percentage of males and females returning to school for a fourth year of high school and the courses in which they choose to enroll
- the percentage of males and females who register in a course but drop the course before writing a diploma examination

Figure 3-1

Ratio of Males to Females Writing Diploma Examinations 1997–98 School Year


English 30
44.0% (N = 9 877)
56.0% (N = 12 584)
English 33
56.5% (N = 6 964)
43.5% (N = 5 352)
Socoal Studies 30
47.8% (N = 9 123)
52.2% (N = 9 972)
Social Studies 33
50.6% (N = 6 847)
49.4% (N = 6 673)
Français 30
39.1% (N = 34)
60.9% (N = 53)
Mathematics 30
49.5 (N = 9 174)
50.5% (N = 9 357)
Mathematics 33
48.8% (N = 5 650
51.2% (N = 5 938)
Biology 30
39.0% (N = 6 411)
61.0% (N = 10 025)
Chemistry 30
47.9% (N = 7 263)
52.1% (N = 7 888)
Physics 30
62.8% (N = 5 507)
37.2% (N = 3 261
Science 30
53.7% (N = 640)
46.3% (N = 551)
0 10 20 30 40 50 60 70 80 90 100
Males
Females
The vertical broken line shows the percentage of all students writing diploma examinations in the 1997-98 school year, whether male (48%) or female (52%)

Is the percentage of males and females who achieve the standards the same in each course?

Figure 3-2 shows that a higher percentage of males than females achieved the *standard of excellence* in their final course marks for Social Studies 30, Social Studies 33, Mathematics 30, and Chemistry 30.

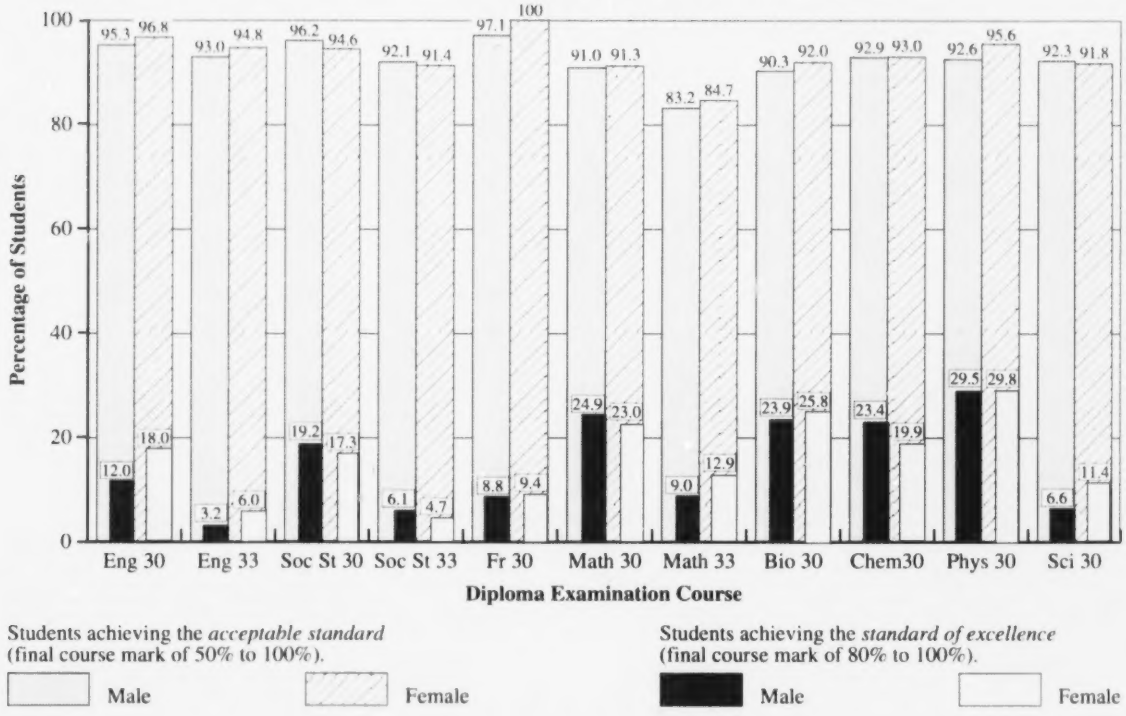
A higher percentage of females than males achieved the *standard of excellence* in their final course marks in English 30, English 33, Français 30, Mathematics 33, Biology 30, Physics 30, and Science 30.

The percentage of females who achieved the *acceptable standard* exceeded the percentage of males in all courses except for Social Studies 30, Social Studies 33, and Science 30.

Table 3-1 shows the actual number of male and female students who achieved standards in each course.

Figure 3-2

Percentage of Students Achieving Standards, by Gender (Final Course Mark) 1997–98 School Year



Students achieving the *acceptable standard* (final course mark of 50% to 100%).

Male Female

Students achieving the *standard of excellence* (final course mark of 80% to 100%).

Male Female

Table 3-1

Number of Students Achieving Standards, by Gender (Final Course Mark) 1997–98 School Year

Course	Students Achieving the Acceptable Standard			Students Achieving the Standard of Excellence		
	Male	Female	Total	Male	Female	Total
English 30	9 538	12 365	21 903	1 207	2 272	3 479
English 33	6 620	5 213	11 833	252	338	590
Social Studies 30	8 804	9 470	18 274	1 750	1 729	3 479
Social Studies 33	6 350	6 135	12 485	427	320	747
Français 30	33	53	86	3	5	8
Mathematics 30	8 401	8 571	16 972	2 296	2 151	4 447
Mathematics 33	4 740	5 067	9 807	518	772	1 290
Biology 30	5 812	9 278	15 090	1 537	2 598	4 135
Chemistry 30	6 768	7 375	14 143	1 707	1 577	3 284
Physics 30	5 131	3 128	8 259	1 635	974	2 609
Science 30	596	508	1 104	43	63	106

Are males and females awarded similar school marks? Is the pattern the same for diploma examination marks?

Table 3-2 shows the results of a comparison between the school-awarded marks and diploma examination marks for males and females. For school-awarded marks, females achieved higher averages than males in all courses. In all subjects, the percentage of females who received an F was smaller than the percentage of males who received F. A greater percentage of females than males achieved an A in all subjects except Chemistry 30.

For diploma examination marks, females achieved higher averages than males in English 30, English 33, Français 30, Mathematics 33, Biology 30, and Physics 30. Males achieved higher diploma examination marks in Social Studies 30, Social Studies 33, Mathematics 30, and Science 30.

For the final course marks, females achieved higher averages than males in English 30, English 33, Français 30, Mathematics 33, Biology 30, Physics 30, and Science 30. The percentage of females receiving an F was greater than the percentage of males in Social Studies 30, Social Studies 33, and Science 30. The percentage of females achieving an A for the final course mark was greater than the percentage of males in English 30, English 33, Français 30, Mathematics 33, Biology 30, Physics 30, and Science 30.

Table 3-2

Provincial Percentage Distribution of A, B, C, and F, Average, and Standard Deviation* of Scores
1997–98 School Year

Course	School-Awarded Mark			Diploma Exam Mark			Final Course Mark		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
English 30									
A (80–100%)	21.8	16.4	26.1	13.9	12.3	15.2	15.4	12.0	18.0
B (65–79%)	43.2	41.1	44.9	35.3	34.9	35.6	41.7	39.6	43.3
C (50–64%)	29.6	35.4	25.0	38.5	40.2	37.2	39.1	43.6	35.6
F (0–49%)	5.4	7.2	3.9	12.3	12.5	12.1	3.8	4.7	3.2
Average (%)	68.7	66.4	70.5	64.6	63.9	65.1	67.0	65.6	68.2
Standard Deviation (%)	12.5	12.5	12.2	13.1	12.9	13.2	11.4	11.2	11.4
English 33									
A (80–100%)	6.1	4.0	8.8	7.6	6.7	8.7	4.4	3.2	6.0
B (65–79%)	34.4	29.3	41.0	40.6	40.9	40.2	38.9	35.3	43.7
C (50–64%)	46.3	50.6	40.6	39.3	39.9	38.5	50.5	54.6	45.1
F (0–49%)	13.2	16.0	9.6	12.6	12.5	12.6	6.2	7.0	5.2
Average (%)	61.0	59.1	63.5	63.5	63.3	63.7	62.8	61.7	64.2
Standard Deviation (%)	12.0	11.8	11.8	11.7	11.5	11.9	9.9	9.6	10.0
Social Studies 30									
A (80–100%)	23.8	23.5	24.1	16.5	18.0	15.0	18.2	19.2	17.3
B (65–79%)	41.6	40.6	42.4	33.8	36.9	30.9	38.4	39.9	37.0
C (50–64%)	30.9	31.8	30.0	33.6	32.5	34.7	38.8	37.1	40.3
F (0–49%)	3.8	4.1	3.5	16.1	12.6	19.4	4.7	3.8	5.4
Average (%)	69.4	69.2	69.7	64.4	66.0	63.0	67.3	67.9	66.7
Standard Deviation (%)	12.0	12.2	11.9	14.3	13.8	14.7	12.3	12.1	12.4
Social Studies 33									
A (80–100%)	6.5	6.1	6.9	9.3	11.6	7.1	5.4	6.1	4.7
B (65–79%)	34.9	33.5	36.3	36.6	40.5	32.7	37.5	39.8	35.1
C (50–64%)	47.2	47.8	46.7	37.6	34.7	40.5	48.8	46.1	51.5
F (0–49%)	11.3	12.6	10.1	16.5	13.3	19.8	8.3	7.9	8.6
Average (%)	61.6	61.1	62.2	62.5	64.3	60.8	62.5	63.1	61.8
Standard Deviation (%)	11.6	11.7	11.4	13.1	13.0	12.9	10.7	10.8	10.6

*Standard deviation is an indication of the amount of variation in a distribution. About 68% of the students' marks will fall within plus or minus one "standard deviation" of the average mark. On the English 30 Diploma Examination, for example, 68% of students who wrote the examination scored between 56.2 and 81.2%.

Table 3-2 (*continued*)

Course	School-Awarded Mark			Diploma Exam Mark			Final Course Mark		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Français 30**									
A (80–100%)	18.4	8.8	24.5	8.0	5.9	9.4	9.2	8.8	9.4
B (65–79%)	48.3	50.0	47.2	47.1	47.1	47.2	57.5	55.9	58.5
C (50–64%)	29.9	35.3	26.4	40.2	41.2	39.6	32.2	32.4	32.1
F (0–49%)	3.4	5.9	1.9	4.6	5.9	3.8	1.1	2.9	0.0
Average (%)	70.3	66.9	72.5	65.9	65.7	66.1	68.4	66.6	69.6
Standard Deviation (%)	10.9	10.1	11.0	9.8	10.4	9.5	8.8	8.9	8.6
Mathematics 30									
A (80–100%)	27.1	26.5	27.7	23.3	25.1	21.5	23.9	24.9	23.0
B (65–79%)	35.5	34.8	36.2	30.9	31.3	30.4	34.4	34.3	34.5
C (50–64%)	29.7	30.0	29.4	27.9	27.2	28.7	32.8	31.8	33.8
F (0–49%)	7.7	8.6	6.7	17.9	16.4	19.4	8.8	9.0	8.7
Average (%)	69.1	68.7	69.4	65.7	66.6	64.8	67.8	68.0	67.5
Standard Deviation (%)	14.4	14.8	14.0	16.8	16.9	16.7	14.7	14.9	14.4
Mathematics 33									
A (80–100%)	14.6	12.1	17.0	11.4	10.3	12.6	11.0	9.0	12.9
B (65–79%)	33.0	31.9	34.0	27.4	28.1	26.7	32.2	32.4	32.0
C (50–64%)	37.5	38.5	36.6	34.7	36.1	33.3	40.7	41.8	39.8
F (0–49%)	15.0	17.5	12.5	26.5	25.5	27.4	16.0	16.8	15.3
Average (%)	63.1	61.8	64.4	59.6	59.5	59.7	61.8	61.1	62.4
Standard Deviation (%)	14.3	14.2	14.2	15.9	15.7	16.2	14.0	13.8	14.2
Biology 30									
A (80–100%)	27.2	25.4	28.4	24.9	24.3	25.2	25.1	23.9	25.8
B (65–79%)	37.4	35.1	38.9	28.7	28.6	28.7	33.6	32.3	34.4
C (50–64%)	29.3	32.2	27.5	27.2	27.1	27.3	32.7	34.1	31.8
F (0–49%)	6.0	7.4	5.2	19.2	19.9	18.8	8.7	9.7	8.0
Average (%)	69.6	68.4	70.3	65.8	65.5	66.0	68.0	67.3	68.5
Standard Deviation (%)	13.4	13.9	13.1	17.3	17.4	17.3	14.6	14.9	14.4
Chemistry 30									
A (80–100%)	26.3	26.8	25.8	19.9	22.2	17.7	21.6	23.4	19.9
B (65–79%)	38.2	36.0	40.1	35.3	35.7	34.9	38.9	37.9	39.9
C (50–64%)	28.3	28.9	27.7	30.8	29.1	32.4	32.3	31.5	33.1
F (0–49%)	7.3	8.3	6.4	14.0	12.9	15.0	7.1	7.1	7.0
Average (%)	69.2	68.8	69.5	65.9	66.9	65.0	67.9	68.3	67.6
Standard Deviation (%)	13.8	14.2	13.3	14.9	15.1	14.7	13.5	13.8	13.1
Physics 30									
A (80–100%)	33.3	30.9	36.5	29.5	30.4	28.0	29.6	29.5	29.8
B (65–79%)	38.3	36.8	40.7	32.3	31.1	34.3	37.6	35.7	40.6
C (50–64%)	23.7	25.7	20.2	23.9	23.6	24.5	26.5	27.3	25.1
F (0–49%)	5.1	6.6	2.5	14.2	14.9	13.1	6.3	7.4	4.4
Average (%)	71.7	70.6	73.6	68.4	68.3	68.5	70.4	69.9	71.3
Standard Deviation (%)	13.7	14.3	12.4	16.7	17.1	16.0	14.2	14.7	13.3

(continued)

*Standard deviation is an indication of the amount of variation in a distribution. About 68% of the students' marks will fall within plus or minus one "standard deviation" of the average mark. On the English 30 Diploma Examination, for example, 68% of students who wrote the examination scored between 56.2 and 81.2%.

**Because very few students wrote the Français 30 examinations, results must be interpreted with caution.

Table 3-2 (*continued*)

Course	School-Awarded Mark			Diploma Exam Mark			Final Course Mark		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Science 30									
A (80–100%)	9.6	6.3	13.4	11.4	11.1	11.8	8.8	6.6	11.4
B (65–79%)	34.9	33.1	37.0	32.6	35.0	29.8	36.1	37.8	34.1
C (50–64%)	44.9	47.3	42.1	39.4	40.6	37.9	47.2	48.0	46.3
F (0–49%)	10.6	13.3	7.4	16.6	13.3	20.5	7.9	7.7	8.2
Average (%)	63.1	61.4	64.9	62.8	63.5	62.0	63.4	63.0	63.9
Standard Deviation (%)	11.5	11.1	11.6	13.3	12.5	14.1	11.3	10.7	11.9

*Standard deviation is an indication of the amount of variation in a distribution. About 68% of the students' marks will fall within plus or minus one "standard deviation" of the average mark. On the English 30 Diploma Examination, for example, 68% of students who wrote the examination scored between 56.2 and 81.2%.

The data presented in this section show gender differences to a greater or lesser degree in all diploma examination courses. Schools should consider these results carefully within their own contexts.

Since individual jurisdiction results will show patterns that differ from the province-wide results, school boards are encouraged to explore gender differences in their own jurisdictions.

Section 4

Results for Population Subgroups

The majority of students who wrote a 1997–98 diploma examination took the course in school as regular students; the second largest group were mature students* with current school-awarded marks. Results for students with both school-awarded marks and diploma examination marks are reported in sections 2 and 3 of this report.

This section reports the results for all students, *including those with no school-awarded marks.* Subgroup definitions and results are reported.

This section will answer these questions:

- Does the percentage of mature students writing diploma examinations vary across courses?
- How does the performance of mature students with current school-awarded marks compare with the performance of non-mature students with current school-awarded marks?
- How does the performance of students with school marks brought forward compare with the results of students with current school-awarded marks?
- How does the performance of mature students challenging the examination compare with the performance of other mature student subgroups?
- For subgroups with current school-awarded marks and diploma examination marks, how does the diploma examination mark average compare with the school-awarded mark average?

Subgroup Definitions

Subgroups are defined by a combination of mature student status and school-awarded mark status. Students in all subgroups have a current diploma examination mark. The subgroups are:

- **Students with a current school-awarded mark**. This group is comprised of non-mature students and mature students.
- **Non-Mature Students, School Mark Brought Forward** Non-mature students who do not have a current school-awarded mark but who have an earlier school-awarded mark.
- **Mature Students, School Mark Brought Forward** Mature students who do not have a current school-awarded mark but who have an earlier school-awarded mark.
- **Mature Students, Challenging Examination** Students with mature status who have no school-awarded mark. Mature students "challenging" a diploma examination do not take the course but do receive course credit if they pass the examination; non-mature students with no school-awarded mark receive no course credit.
- **Non-Mature Students, No School Mark** Non-mature students who have no school-awarded mark.

When a mature student earns a diploma examination mark that is higher than that student's school-awarded mark, the diploma examination mark becomes the final course mark; otherwise, the normal blending is applied to calculate the final course mark.

Excluded Groups

Not included in any of the subgroups are students who were exempted from all or part of the examination, or who wrote a substantially different form of the examination because of special considerations. Students in English 30 or English 33 who, by special permission, wrote the two parts of the examination in two different examination sittings (e.g., January and June) are also excluded. Very few students fall into these categories.

Results for Français 30 are not included because of the small number of students writing the examination.

Results

Three tables are provided for each diploma examination course. In the first table, the number and percentage of non-mature and mature students writing are given. The second table gives the number of students in each subgroup, their average diploma examination mark, and standard deviations of diploma examination marks for all subgroups. The third table provides data for subgroups with school-awarded marks. It includes the number of students in each subgroup, their average school-awarded mark, and the standard deviation of school-awarded marks for these subgroups.

* A student with mature status is one who, as of September 1 of the current school year, is 19 years of age or older *or* is the holder of a previously-awarded Alberta high school diploma or equivalent (*Guide to Education, ECS to Grade 12, 1998*, page 105).

English 30: 1997–98 School Year

Achievement in English 30 by subgroups is compared in Tables 4-1 to 4-3. About one in nine English 30 students who wrote the 1997–98 diploma examinations had mature status.

Of students with current school-awarded marks, non-mature students achieved higher averages in both school-awarded marks and diploma examination marks than did mature students.

Among all subgroups, non-mature students with no school-awarded marks achieved the highest average in diploma examination marks, while mature students with school marks brought forward achieved the lowest average.

Table 4-1

English 30
Status of Students Writing

Type of Student	Number of Students	Percentage
Non-Mature Students	20 407	88.6
Mature Students	2 633	11.4
Total	23 040	100.0

Table 4-2

English 30
Diploma Examination Marks for Population Subgroups

Subgroup	Number of Students	Average	Standard Deviation*
Students with School-Awarded Mark	21 863	64.7	13.1
Non-Mature Students	**19 725**	**65.5**	**12.8**
Mature Students	**2 138**	**57.0**	**12.8**
Non-Mature Students, School Mark Brought Forward	474	61.5	12.7
Mature Students, School Mark Brought Forward	124	52.0	11.5
Mature Students, Challenging Examination	371	59.9	14.6
Non-Mature Students, No School Mark	208	68.5	16.4

Table 4-3

English 30
School-Awarded Marks for Population Subgroups

Subgroup	Number of Students	Average	Standard Deviation*
Students with School-Awarded Marks	21 863	68.8	12.5
Non-Mature Students	**19 725**	**69.4**	**12.2**
Mature Students	**2 138**	**63.1**	**13.4**
Non-Mature Students, School Mark Brought Forward	474	67.5	14.0
Mature Students, School Mark Brought Forward	124	64.8	10.4

*For an explanation of the standard deviation, see footnote to Table 3-2, page 11.

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English 33: 1996–97 School Year

Achievement in English 33 by subgroups is compared in Tables 4-4 to 4-6. About one in seven English 33 students who wrote the 1997–98 diploma examinations had mature status.

Of students with current school-awarded marks, non-mature and mature students achieved similar averages in school-awarded marks; however, non-mature students achieved a higher average on the diploma examination than did mature students.

Among all subgroups, non-mature students with no school marks achieved the highest average in diploma examination marks. Subgroups with school marks brought forward achieved much lower averages in diploma examination marks compared with the other subgroups.

Table 4-4

English 33
Status of Students Writing

Type of Student	Number of Students	Percentage
Non-Mature Students	10 918	85.5
Mature Students	1 851	14.5
Total	12 769	100.0

Table 4-5

English 33
Diploma Examination Marks for Population Subgroups

Subgroup	Number of Students	Average	Standard Deviation*
Students with School-Awarded Marks	12 105	63.6	11.6
Non-Mature Students	**10 643**	**64.1**	**11.2**
Mature Students	**1 462**	**59.8**	**13.5**
Non-Mature Students, School Mark Brought Forward	147	56.1	10.5
Mature Students, School Mark Brought Forward	64	50.5	12.3
Mature Students, Challenging Examination	325	64.0	14.8
Non-Mature Students, No School Mark	128	67.2	10.9

Table 4-6

English 33
School-Awarded Marks for Population Subgroups

Subgroup	Number of Students	Average	Standard Deviation*
Students with School-Awarded Marks	12 105	61.1	12.0
Non-Mature Students	**10 643**	**61.1**	**11.7**
Mature Students	**1 462**	**61.1**	**13.4**
Non-Mature Students, School Mark Brought Forward	147	51.2	12.5
Mature Students, School Mark Brought Forward	64	61.6	11.8

*For an explanation of the standard deviation, see footnote to Table 3-2, page 11.

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Social Studies 30: 1997–98 School Year

Achievement in Social Studies 30 by subgroups is compared in Tables 4-7 to 4-9. About one in 18 Social Studies 30 students who wrote the 1997–98 diploma examinations had mature status.

Of students with current school-awarded marks, non-mature students achieved higher averages in both school-awarded marks and diploma examination marks compared with mature students.

Among all subgroups, non-mature students with current school-awarded marks achieved the highest average on the examination. All subgroups with school marks brought forward achieved lower averages in diploma examination marks compared with regular school subgroups.

Table 4-7

Social Studies 30
Status of Students Writing

Type of Student	Number of Students	Percentage
Non-Mature Students	18 330	94.7
Mature Students	1 016	5.3
Total	19 346	100.0

Table 4-8

Social Studies 30
Diploma Examination Marks for Population Subgroups

Subgroup	Number of Students	Average	Standard Deviation*
Students with School-Awarded Marks	18 748	64.6	14.3
Non-Mature Students	**17 884**	**65.0**	**14.2**
Mature Students	**864**	**56.3**	**14.1**
Non-Mature Students, School Mark Brought Forward	302	55.5	13.1
Mature Students, School Mark Brought Forward	45	48.6	14.0
Mature Students, Challenging Examination	107	53.5	15.3
Non-Mature Students, No School Mark	144	57.8	17.5

Table 4-9

Social Studies 30
School-Awarded Marks for Population Subgroups

Subgroup	Number of Students	Average	Standard Deviation*
Students with School-Awarded Marks	18 748	69.6	12.0
Non-Mature Students	**17 884**	**69.9**	**11.8**
Mature Students	**864**	**62.3**	**13.5**
Non-Mature Students, School Mark Brought Forward	302	61.5	12.7
Mature Students, School Mark Brought Forward	45	61.3	11.4

*For an explanation of the standard deviation, see footnote to Table 3-2, page 11.

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Social Studies 33: 1997–98 School Year

Achievement in Social Studies 33 by subgroups is compared in Tables 4-10 to 4-12. About one in 13 Social Studies 33 students who wrote the 1997–98 diploma examinations had mature status.

Of students with current school-awarded marks, non-mature students achieved higher averages in diploma examination marks than did mature students. Aa similar pattern was noted for school-awarded marks.

Among all subgroups, non-mature students with current school-awarded marks achieved the highest average on the examination. Mature students with school marks brought forward achieved the lowest averages in diploma examination marks.

Table 4-10

Social Studies 33
Status of Students Writing

Type of Student	Number of Students	Percentage
Non-Mature Students	12 746	92.4
Mature Students	1 048	7.6
Total	13 794	100.0

Table 4-11

Social Studies 33
Diploma Examination Marks for Population Subgroups

Subgroup	Number of Students	Average	Standard Deviation*
Students with School-Awarded Marks	13 294	62.8	13.0
Non-Mature Students	**12 396**	**63.1**	**12.8**
Mature Students	**898**	**58.4**	**14.9**
Non-Mature Students, School Mark Brought Forward	190	50.9	10.7
Mature Students, School Mark Brought Forward	36	39.3	10.5
Mature Students, Challenging Examination	114	57.4	16.3
Non-Mature Students, No School Mark	160	59.5	12.8

Table 4-12

Social Studies 33
School-Awarded Marks for Population Subgroups

Subgroup	Number of Students	Average	Standard Deviation*
Students with School-Awarded Marks	13 294	61.8	11.5
Non-Mature Students	**12 396**	**61.9**	**11.4**
Mature Students	**898**	**59.8**	**13.6**
Non-Mature Students, School Mark Brought Forward	190	51.5	10.7
Mature Students, School Mark Brought Forward	36	53.8	8.6

*For an explanation of the standard deviation, see footnote to Table 3-2, page 11.

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Mathematics 30: 1997–98 School Year

Achievement in Mathematics 30 by subgroups is compared in Tables 4-13 to 4-15. About one in eight Mathematics 30 students who wrote the 1997–98 diploma examinations had mature status.

Of students with current school-awarded marks, non-mature students achieved higher averages in both school-awarded marks and diploma examination marks than did mature students.

Among all subgroups, non-mature students with current school marks achieved the highest average on the diploma examination, while mature students challenging the examination obtained the lowest average.

Table 4-13

Mathematics 30
Status of Students Writing

Type of Student	Number of Students	Percentage
Non-Mature Students	16 483	87.8
Mature Students	2 283	12.2
Total	18 766	100.0

Table 4-14

Mathematics 30
Diploma Examination Marks for Population Subgroups

Subgroup	Number of Students	Average	Standard Deviation*
Students with School-Awarded Marks	17 995	65.8	16.8
Non-Mature Students	**15 970**	**66.7**	**16.6**
Mature Students	**2 025**	**58.1**	**16.5**
Non-Mature Students, School Mark Brought Forward	445	66.6	16.3
Mature Students, School Mark Brought Forward	91	52.1	13.8
Mature Students, Challenging Examination	167	48.9	19.6
Non-Mature Students, No School Mark	68	57.9	20.2

Table 4-15

Mathematics 30
School-Awarded Marks for Population Subgroups

Subgroup	Number of Students	Average	Standard Deviation*
Students with School-Awarded Marks	17 995	69.0	14.4
Non-Mature Students	**15 970**	**69.6**	**14.1**
Mature Students	**2 025**	**64.7**	**15.8**
Non-Mature Students, School Mark Brought Forward	445	70.3	14.7
Mature Students, School Mark Brought Forward	91	65.6	13.8

*For an explanation of the standard deviation, see footnote to Table 3-2, page 11.

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Mathematics 33: 1997–98 School Year

Achievement in Mathematics 33 by subgroups is compared in Tables 4-16 to 4-18. About one in eight Mathematics 33 students who wrote the 1997–98 diploma examinations had mature status.

Of students with current school-awarded marks, mature students had slightly higher averages on the school-awarded marks; however, non-mature students had slightly higher averages on the diploma examination marks.

Among all subgroups, non-mature students with current school marks achieved the highest average on the diploma examination, while mature students with school marks brought forward achieved the lowest average.

Table 4-16

Mathematics 33
Status of Students Writing

Type of Student	Number of Students	Percentage
Non-Mature Students	10 328	87.3
Mature Students	1 499	12.7
Total	11 827	100.0

Table 4-17

Mathematics 33
Diploma Examination Marks for Population Subgroups

Subgroup	Number of Students	Average	Standard Deviation*
Students with School-Awarded Marks	11 454	59.7	15.9
Non-Mature Students	**10 118**	**59.8**	**15.7**
Mature Students	**1 336**	**59.2**	**17.2**
Non-Mature Students, School Mark Brought Forward	113	49.5	14.6
Mature Students, School Mark Brought Forward	21	43.9	20.0
Mature Students, Challenging Examination	142	52.2	20.0
Non-Mature Students, No School Mark	97	55.2	15.1

Table 4-18

Mathematics 33
School-Awarded Marks for Population Subgroups

Subgroup	Number of Students	Average	Standard Deviation*
Students with School-Awarded Marks	11 454	63.2	14.2
Non-Mature Students	**10 118**	**63.2**	**14.0**
Mature Students	**1 336**	**63.7**	**16.1**
Non-Mature Students, School Mark Brought Forward	113	52.5	14.4
Mature Students, School Mark Brought Forward	21	58.2	16.2

*For an explanation of the standard deviation, see footnote to Table 3-2, page 11.

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Biology 30: 1997–98 School Year

Achievement in Biology 30 by subgroups is compared in Tables 4-19 to 4-21. About one in 11 Biology 30 students who wrote the 1997–98 diploma examinations had mature status.

Of students with current school-awarded marks, mature students achieved lower averages in both school-awarded marks and in diploma examination marks compared with non-mature students.

Among all subgroups, non-mature students with current school-awarded marks achieved the highest average on the diploma examination. Mature students with school marks brought forward achieved the lowest average on the diploma examination.

Table 4-19

Biology 30
Status of Students Writing

Type of Student	Number of Students	Percentage
Non-Mature Students	15 093	90.8
Mature Students	1 529	9.2
Total	16 622	100.0

Table 4-20

Biology 30
Diploma Examination Marks for Population Subgroups

Subgroup	Number of Students	Average	Standard Deviation*
Students with School-Awarded Marks	16 076	66.0	17.3
Non-Mature Students	**14 720**	**66.6**	**17.2**
Mature Students	**1 356**	**59.6**	**16.4**
Non-Mature Students, School Mark Brought Forward	318	58.8	16.2
Mature Students, School Mark Brought Forward	42	47.3	12.2
Mature Students, Challenging Examination	131	54.1	18.6
Non-Mature Students, No School Mark	55	60.3	20.4

Table 4-21

Biology 30
School-Awarded Marks for Population Subgroups

Subgroup	Number of Students	Average	Standard Deviation*
Students with School-Awarded Marks	16 076	69.7	13.4
Non-Mature Students	**14 720**	**70.1**	**13.2**
Mature Students	**1 356**	**65.2**	**14.9**
Non-Mature Students, School Mark Brought Forward	318	65.3	13.3
Mature Students, School Mark Brought Forward	42	60.1	11.5

*For an explanation of the standard deviation, see footnote to Table 3-2, page 11.

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Chemistry 30: 1997–98 School Year

Achievement in Chemistry 30 by subgroups is compared in Tables 4-22 to 4-24. About 10% of the Chemistry 30 students who wrote the 1997–98 diploma examinations had n ature status.

Of students with current school-awarded marks, non-mature students achieved higher averages in both school-awarded marks and diploma examination marks than did mature students.

Among all subgroups, non-mature students with no school-awarded marks achieved the highest average on the diploma examination. Mature students with school marks brought forward achieved the lowest diploma examination average.

Table 4-22

Chemistry 30
Status of Students Writing

Type of Student	Number of Students	Percentage
Non-Mature Students	13 765	90.0
Mature Students	1 537	10.0
Total	15 302	100.0

Table 4-23

Chemistry 30
Diploma Examination Marks for Population Subgroups

Subgroup	Number of Students	Average	Standard Deviation*
Students with School-Awarded Marks	14 906	66.0	14.9
Non-Mature Students	**13 511**	**66.4**	**14.8**
Mature Students	**1 395**	**61.6**	**14.8**
Non-Mature Students, School Mark Brought Forward	204	63.6	16.4
Mature Students, School Mark Brought Forward	41	51.4	14.9
Mature Students, Challenging Examination	101	53.5	19.2
Non-Mature Students, No School Mark	50	71.3	19.5

Table 4-24

Chemistry 30
School-Awarded Marks for Population Subgroups

Subgroup	Number of Students	Average	Standard Deviation*
Students with School-Awarded Marks	14 906	69.2	13.7
Non-Mature Students	**13 511**	**69.6**	**13.6**
Mature Students	**1 395**	**65.4**	**14.3**
Non-Mature Students, School Mark Brought Forward	204	68.4	15.5
Mature Students, School Mark Brought Forward	41	60.6	15.4

*For an explanation of the standard deviation, see footnote to Table 3-2, page 11.

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Physics 30: 1997–98 School Year

Achievement in Physics 30 by subgroups is compared in Tables 4-25 to 4-27. About one in 12 Physics 30 students who wrote the 1997–98 diploma examinations had mature status.

Of students with current school-awarded marks, non-mature students achieved higher averages in both school-awarded marks and diploma examination marks than did mature students.

Among all subgroups, non-mature students with current school-awarded marks achieved the highest average on the diploma examination. Mature students with school marks brought forward had the lowest average on the diploma examination.

Table 4-25

Physics 30
Status of Students Writing

Type of Student	Number of Students	Percentage
Non-Mature Students	8 101	91.5
Mature Students	753	8.5
Total	8 854	100.0

Table 4-26

Physics 30
Diploma Examination Marks for Population Subgroups

Subgroup	Number of Students	Average	Standard Deviation*
Students with School-Awarded Marks	8 634	68.5	16.6
Non-Mature Students	**7 966**	**69.1**	**16.4**
Mature Students	**668**	**62.4**	**17.1**
Non-Mature Students, School Mark Brought Forward	111	65.6	18.2
Mature Students, School Mark Brought Forward	23	50.0	17.0
Mature Students, Challenging Examination	62	58.7	21.6
Non-Mature Students, No School Mark	24	60.7	22.3

Table 4-27

Physics 30
School-Awarded Marks for Population Subgroups

Subgroup	Number of Students	Average	Standard Deviation*
Students with School-Awarded Marks	8 634	71.7	13.6
Non-Mature Students	**7 966**	**72.2**	**13.4**
Mature Students	**663**	**66.0**	**14.9**
Non-Mature Students, School Mark Brought Forward	111	71.6	15.0
Mature Students, School Mark Brought Forward	23	59.6	13.5

*For an explanation of the standard deviation, see footnote to Table 3-2, page 11.

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Science 30: 1997–98 School Year

Achievement in Science 30 by subgroups is compared in Tables 4-28 to 4-30. About one in 15 Science 30 students who wrote the 1997–98 diploma examinations had mature status.

Of students with current school-awarded marks, non-mature students achieved a higher average on school-awarded marks. Mature students achieved a higher average on the diploma examinations.

Among all subgroups, mature students with current school-awarded marks achieved the highest average on the diploma examination. Non-mature students with no school marks achieved the lowest average on the diploma examination.

These results may be unstable due to the small size of each subgroup and therefore should be interpreted with caution.

Table 4-28

Science 30
Status of Students Writing

Type of Student	Number of Students	Percentage
Non-Mature Students	1 124	93.5
Mature Students	78	6.5
Total	1 202	100.0

Table 4-29

Science 30
Diploma Examination Marks for Population Subgroups

Subgroup	Number of Students	Average	Standard Deviation*
Students with School-Awarded Marks	1 188	62.9	13.3
Non-Mature Students	**1 120**	**62.7**	**13.2**
Mature Students	**68**	**64.9**	**14.5**
Non-Mature Students, School Mark Brought Forward	2	53.0	4.2
Mature Students, School Mark Brought Forward	1	50.0	--
Mature Students, Challenging Examination	9	62.0	14.0
Non-Mature Students, No School Mark	2	40.5	0.7

Table 4-30

Science 30
School-Awarded Marks for Population Subgroups

Subgroup	Number of Students	Average	Standard Deviation*
Students with School-Awarded Marks	1 188	63.1	11.5
Non-Mature Students	**1 120**	**63.2**	**11.5**
Mature Students	**68**	**61.5**	**12.1**
Non-Mature Students, School Mark Brought Forward	2	57.5	10.6
Mature Students, School Mark Brought Forward	1	53.0	--

*For an explanation of the standard deviation, see footnote to Table 3-2, page 11.

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Summary

Does the percentage of mature students writing diploma examinations vary across courses?

In 1997–98, the percentage of mature students writing examinations ranged from 5.3% in Social Studies 30 to 14.5% in English 33.

How does the performance of mature students with current school-awarded marks compare with the performance of non-mature students with current school-awarded marks?

In 1997–98, average marks on diploma examinations for non-mature students with current school-awarded marks were higher than the averages for mature students with current school-awarded marks in all courses except Science 30.

How does the performance of mature students challenging the examination compare with the performance of other mature student subgroups?

On the 1998 diploma examinations, mature students challenging the diploma examination achieved the highest average in English 30 and English 33 but the lowest average in Mathematics 30.

For subgroups with current school-awarded marks and diploma examination marks, how does the diploma examination mark average compare with the school-awarded mark average?

Both subgroups had higher averages in school-awarded marks than in diploma examination marks, with the following exceptions: non-mature students in English 33 and Social Studies 33, and mature students in Science 30.

Section 5

Special Study: Achievement-Over-Time for the Multiple-Choice Section of the English 30 and Social Studies 30 Examinations 1989–1998

Introduction

An important goal at Alberta Education is to answer the question:

Has student achievement, as measured by the diploma examinations, changed over time?

Since new diploma examinations are developed each year, it is not possible to make direct comparisons of achievement from one year to the next. Readministration of past diploma examinations would not give an accurate indication of changes to student performance because many students have access to past examinations for practice and review.

This year, to answer the question in English 30 and Social Studies 30, the Student Evaluation Branch used a statistical method called "linear equating" to examine changes in student performance. Linear equating allows us to compare multiple-choice test scores over time. This method has been used each year since 1989 to track changes in achievement and to present a picture of how student performance on English 30 and Social Studies 30 diploma examinations has changed over time.

To identify if there have been changes in student performance on the multiple-choice sections of the diploma examinations, the student scores on the June diploma examinations for each year are equated to the baseline year of 1992. In order to equate the scores from one year to another, we need to have a common reference point. Each June, a common anchor test is administered to a sample of students who are taking diploma examinations. The anchor tests are designed and developed to be parallel to the multiple-choice components of each diploma examination. They consist of a set of questions having the same content and focus as the multiple-choice component of the diploma examination.

The questions from these anchor tests are not released to the public and are administered again in subsequent years. Following the administration and scoring of the diploma examinations, a student's anchor test mark is matched with his or her multiple-choice section on a diploma examination.

Table 5-1 presents the number of English 30 and Social Studies 30 students who wrote anchor tests each year from 1989 to 1998. Only students with current school-awarded and diploma examination marks are included in the samples.

Table 5-1

Number of Students Writing the Anchor Tests for English 30 and Social Studies 30 from 1989 to 1998

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
English 30	360	319	297	**352**	364	207	346	285	270	203
Social Studies 30	634	464	303	**378**	327	238	309	220	296	235

Equating Procedure

To place the results of different tests on the same scale, all scores are reported on the score scale from the baseline year. The baseline year for the English 30 and Social Studies 30 diploma examination programs is 1992. Linear equating is used to equate the results from each diploma examination to the baseline.

The equating method allows a student's score to be transformed onto the scale of the baseline year. That is, by applying the equating function calculated for English 30 students who wrote the June 1998 diploma administration of the examination, it is possible to transform that score onto the June 1992 English 30 score scale as a way of comparing achievement over time.

Results

Table 5-2 and Figure 5-1 show the mean percentage scores equated to the 1992 scores for the multiple-choice component of the diploma examinations in this study for English 30 and Social Studies 30. These scores can be used to compare the provincial student achievement each year. Differences are considered significant when the probability due to chance is equal to or less than 1% ($p = 0.01$).

Table 5-2

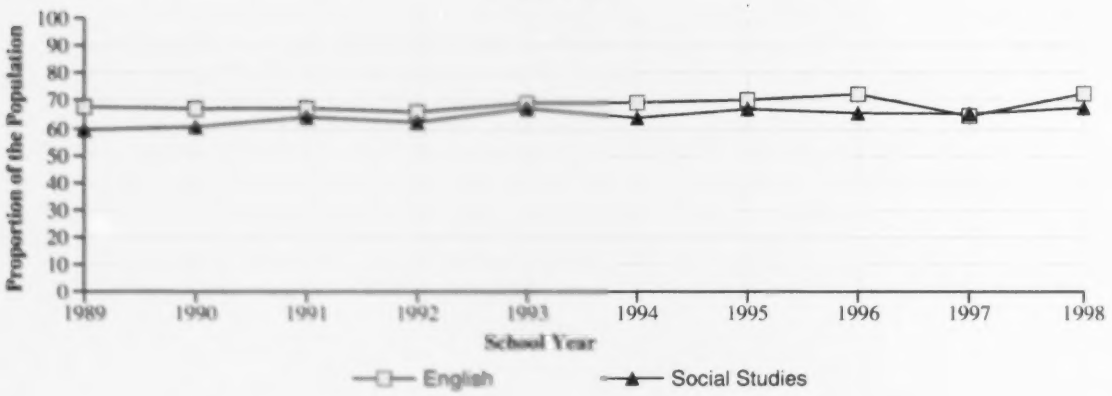
Equated Mean Percentage Scores on the Multiple-Choice Component of the English 30 and Social Studies 30 Diploma Examinations from 1989 to 1998

	1989	1990	1991	**1992**[1]	1993	1994	1995	1996	1997	1998
English 30	68.5	68.1	68.2	**67.5**	69.3	69.4	70.0	71.2[2]	66.7[3]	71.3[4]
Social Studies 30	63.8	64.4	66.4	**65.4**	68.2[5]	66.3	68.1[6]	67.3[7]	67.2[8]	68.4[9]

[1]Baseline year: actual percentage on machine-scored component of diploma examination.
[2]Equated mean is significantly larger than the means for 1989 to 1992 and 1997.
[3]Equated mean is significantly smaller than the means for 1995 and 1996 and 1998.
[4]Equated mean is significantly larger than the means for 1989 to 1992 and 1997.
[5]Equated mean is significantly larger than the means for 1989, 1990, and 1992.
[6]Equated mean is significantly larger than the means for 1989, 1990, and 1992.
[7]Equated mean is significantly larger than the means for 1989 and 1990.
[8]Equated mean is significantly larger than the means for 1989 and 1990.
[9]Equated mean is significantly larger than the means for 1989, 1990, 1992, and 1994.

Figure 5-1

Achievement-Over-Time Results on the Multiple-Choice Section of the English 30 and Social Studies 30 Diploma Examinations from 1989 to 1998



Has achievement, as measured by the multiple-choice component of the diploma examinations, changed over the past few years?

In English 30, there has been a gradual improvement in student performance from 1989 to 1998. It appears that the lower achievement in 1997 was not a trend but perhaps an anomaly. Achievement was significantly higher in 1998 than in 1989, 1990, 1991, 1992, and 1997; in fact, it was the highest since the achievement-over-time study began.

In Social Studies 30, there has been a gradual improvement in students' performance from 1989 to 1998. The 1998 level of achievement is the highest since the achievement-over-time study began, significantly higher than in 1989, 1990, 1992, and 1994.

Despite the statistical significance of differences that occur between some years, as a whole, the change in equated means from 1989 to 1998 in both English 30 and Social Studies 30 represents a very slight increase, as Figure 5-1 demonstrates.

Conclusions

The results of the multiple-choice study suggest that the equated averages from 1989 to 1998 have not changed drastically from year to year. The equated averages for both English 30 and Social Studies 30 were the highest in 1998. Although the equated averages for English 30 and Social Studies 30 are very similar for all years, there appears to be a slight upward trend from 1989 to 1998.

Section 6

Special Study: Achievement-Over-Time for the Biology 30 Extended Written-Response Question (June 1995 and June 1998 Comparison)

Introduction

In July 1998, a study was conducted to look at the achievement over time on the extended written-response question (question 2) of the Biology 30 diploma examination. The purpose of the study was to try to answer the following four questions regarding standards and achievement in Biology 30 writing.

1. Did the *acceptable standard* and the *standard of excellence* on the Biology 30 extended written-response question change from the June 1995 examination to the June 1998 examination?
2. How was the Biology 30 extended written-response question different in June 1995 than it was in June 1998?
3. What effect has the extended written-response question had on student achievement over time?
4. Has student achievement at the *acceptable standard* and the *standard of excellence* on the Biology 30 extended written-response question changed from June 1995 to June 1998?

Procedure

Fourteen experienced Biology teachers and two post-secondary Biology professors participated in the study. The participants were divided into two groups; one group compared the characteristics of student responses at the *standard of excellence* for the two years and the other group compared the characteristics of student responses at the *acceptable standard* for the two years.

Each group member randomly selected and read eight student responses to the extended written-response question from archived June 1995 diploma examinations. Using the 1995 scoring criteria, each participant then chose two papers that represented the mid-range of the standard their group was studying. Thus, a sample of 16 papers at the *acceptable standard* and a sample of 16 papers at the *standard of excellence* were compiled. Working in pairs, group members read four of the papers and described in writing the student responses in three general categories:

i. Thoughtfulness (completeness and breadth of content; depth of content; consistency of thought and treatment of content)
ii. Complexity (relating unfamiliar context information to course content; accurate and appropriate application of course content; significance and complexity of content; complexity of societal issues evaluated; choice of technologies described)
iii. Correctness (accuracy of content; level of scientific vocabulary used; general communication skills, including diagrams)

This procedure was repeated for the June 1998 extended written-response question. The groups compared the descriptions they had written, recording in writing the similarities and differences for the two years. They were also asked to formulate a tentative response, for their respective group, to the first question:

> Did the *acceptable standard* and the *standard of excellence* on the Biology 30 extended written-response question change from the June 1995 examination to June 1998 examination?

Each group presented a summary and their conclusions at a tape-recorded session moderated by a representative from Alberta Education. In addition, group members were asked to confirm their support of the conclusions reached.

Questions 2 and 3 were discussed informally and this discussion was also tape-recorded.

Results

Acceptable Standard of Achievement (2 out of 4)

The similarities and differences identified for the papers at the *acceptable standard* have been paraphrased in Table 6-1. Students at this standard in both 1995 and 1998 attempted to address all aspects of the question asked, but their responses lacked depth and were superficial in nature. Often, these students used correct terminology but they did not expand on the meaning of the terminology. Identification of technologies was clear, but details about processes involved in technologies were weak. Societal issues were approached from a

personal point of view and were written in narrative form. Diagrams were either not used to support responses or were used incorrectly. Students correctly identified the concepts but did not correctly explain them or apply them. Word usage was often inappropriate or clarification of ideas was poor.

In 1995, responses revealed a narrow focus in the links between science and society, but that focus was expanded in 1998 responses. In 1998, the responses had clearer connections between science, technology, and society. References to the context were clearly seen in the 1998 responses but not in the 1995 responses. In 1995, students tended to deal with simple societal issues; whereas, in 1998 they attempted to address broad societal issues linked to science. There was a decline in general communication skills in the 1998 student responses as compared with the 1995 student responses at this standard. However, students expanded their use of scientific vocabulary in 1998 as compared with 1995.

Standard of Excellence (4 out of 4)

The similarities and differences between the 1995 and 1998 papers at the *standard of excellence* have been paraphrased in Table 6-2. Student responses at this standard of achievement in both 1995 and 1998 addressed all aspects of the question with a consistency of thinking. In 1998, responses demonstrated a clear link to the context provided in the question. In 1995, very little context was provided; therefore, the participants did not think it was possible to evaluate the students' ability to link their responses to the context. In both years, students were able to apply significant biology content to the question in an appropriate way. Societal issues were dealt with from an individual rather than societal point of view in both years. The technologies that students chose to discuss in their responses were appropriate. In both years, the content pertaing to concepts was accurate. The communication was clear, organized, and logical in both years. Students used complete sentences, correct spelling, and good grammar consistently in all papers at this standard in both years.

Table 6-1

Comparison June 1995 and June 1998 *Acceptable Standard*

Descriptive Criteria	Qualitative Description	
	Similarities	**Differences**
Thoughtfulness	• Students attempted to address all demands of the question. • Responses lacked depth and were superficial. • Scientific terminology was used, but students demonstrated little ability to expand on it.	• STS connections seemed to be more clearly made in the 1998 responses. • Responses in 1995 had a narrow focus; whereas, in 1998, responses contained broader links between science and society.
Complexity	• Rote knowledge was evident; however, when students tried to expand or justify their responses, their attempts were limited. • Identification of biology concepts appeared to be an easy skill, yet extended application of them was difficult and demanding. • Identification of technologies was clear, but procedural details were missing from responses. • Issues were addressed from a personal perspective and were often written in narrative form.	• References to the context were clearly seen in the 1998 papers; indeed, most students reiterated information from the context box. • There was a shift from addressing simple issues in 1995 to an attempt to examine societal issues on a broader scale and to link them to science in 1998.
Correctness	• Diagrams were generally not used to support responses, and if used, contained misrepresentations. • Students were able to accurately identify concepts but had difficulty applying or explaining them. • Word usage (appropriateness and clarifity) was poor.	• General communication skills declined in 1998. • More scientific vocabulary was used in 1998.

In 1998, the responses showed significantly more depth than they did in 1995: they were more complex, evaluation of societal issues was less superficial, and explanation of technologies included more detail. More sophsiticated scientific vocabulary was used in 1998.

Discussion and Conclusions

1. Did the *acceptable standard* and the *standard of excellence* on the Biology 30 extended written-response question change from the June 1995 examination to the June 1998 examination?

The group studying the *acceptable standard* of achievement concluded that the standard had changed slightly from June 1995 to June 1998. They specifically noted that:

- reading demands increased from 1995 to 1998
- communication standards diminished from 1995 to 1998
- Biology 30 content required to meet the standard had increased from 1995 to 1998

An important point brought up by the group was the wide variety of approaches at this standard.

- Students could be good communicators with very little to say.
- Students could approach the question broadly but at a superficial level.
- Students could write an above-average response to one aspect of the question and provide little or no biology content in their response to another aspect of the question.
- Students could have a fair amount of biology content in their answer but present it in a weakly communicated format.

In 1995, a well-communicated answer with very little biology content in it could have received a 2 out of 4, but

Table 6-2

Comparison June 1995 and June 1998 *Standard of Excellence*

Descriptive Criteria	Qualitative Description	
	Similarities	**Differences**
Thoughtfulness	• All elements of the question were addressed. • Same degree of consistent development of ideas.	• Even though depth appeared similar at first glance, when examined in relation to the expectations of the question, there was significantly more depth in 1998 than in 1995.
Complexity	• Appropriate application of course content. • Similar significance of biology content (obvious examples chosen). • Societal issues were addressed from an individual point of view rather than from a societal or ethical point of view. • Technologies chosen were appropriate.	• There was no assessment of the linkage of context to content in 1995, therefore no comparisons can be made on this topic. In 1998, linkage of context to content was good. • Biology content included in 1998 responses was more complex and was applied accurately. • Evaluation of societal issues was more superficial in 1995. • Explanation of technologies included more detail in 1998.
Correctness	• The content pertaining to concepts was accurate. A few papers had minor errors in details. • Communication was clear, organized, and logical. Students uses complete sentences, correct spelling, and good grammar.	• Higher level of scientific vocabulary was used in 1998.

not in 1998. Likewise, a poorly communicated answer with adequate biology content in it could have received a 2 out of 4 in 1998, but not in 1995. This indicates that the emphasis has changed from how well students are communicating biology to how much biology students know at the *acceptable standard*.

The group studying the *standard of excellence* concluded that the standard had changed from June 1995 to June 1998. Student responses required more depth, complexity, and sophistication in 1998 to meet this standard than they did in 1995. As one participant related in the discussion that followed: "...they're still [in 1998] communicating as well as they were in 1995.... it's just that now they've got something to communicate; there's a lot of material in [the responses], and they're giving [the science, technology, and society content] to us and we're expecting it."

All group members concurred with the conclusions reached in the study.

2. How was the Biology 30 extended written-response question different in June 1998 than it was in June 1995?

One of the difficulties encountered in this study was the difference between the extended written-response question in June 1995 and in June 1998. The context box provided in 1995 contained very brief information, and students did not have to integrate information from it into their responses. In 1998, the context box contained an extensive report that formed the basis for the student response—the "story" to which the science, technology, and society aspects of the question were linked. The 1998 question gave more direction to the students. The context box provided them with a springboard for their response; the sub-parts of the question were clearer and more directed, which allowed weaker students to respond and encouraged more depth from stronger students. The 1995 question was more open-ended, which teachers felt was more difficult for weaker students. As well, the inclusion of more content in the 1998 question allowed more students to demonstrate strengths in at least one aspect of the response. The 1995 question was phrased such that students could have used Science 10 curriculum content to adequately develop a response; whereas, the 1998 question required the use of specific Biology 30 curriculum content.

3. What effect has the extended written-response question had on student achievement over time?

During this discussion, the group members strongly supported the inclusion of an extended written-response question on the diploma examination. They cited its benefits to student learning, to the improvement of teaching, and to the promotion of scientific literacy for students in school and in their adult lives. They felt that teachers were increasing the use of contextual resources in response to the demands of the extended written-response question. Students feel encouraged to discuss science issues that arise from media sources, and they respond more favourably to the teaching of biology in the classroom and to the Biology 30 diploma examination as a result of this general increase in the contextual nature in their learning experiences. As well, one of the post-secondary representatives felt that students are becoming less "antagonistic" to science writing at the post-secondary level. The participants also felt that the important skill of applying science knowledge to societal issues was fostered by this form of teaching and by the changes in the examination. Although this additional benefit to achievement cannot be evaluated by our examination processes, it is a goal of Alberta Education. Participants had many anecdotal examples to support their views. Students are reading about science, and they are excited about it! The conclusion of the group was that increased scientific literacy and promotion of lifelong learning in students are benefits of the extended written-response question and are evident in the achievement-over-time study.

4. Has student achievement at the *acceptable standard* and the *standard of excellence* on the Biology 30 diploma examination extended written-response question changed from June 1995 to June 1998?

In June 1995, 64.6 % of students achieved the *acceptable standard* on the extended written-response question compared with 78.2 % in June 1998. The percentage of students who achieved the *standard of excellence* on the extended written-response question in 1995 was 21.7% compared with 27.3% in June 1998. These taken with the observations of experts that both standards have increased in difficulty leads to the conclusion that student achievement on the written-response question at both the acceptable and standard of excellence improved between June 1996 and June 1998.

Section 7

Examiners' Annual Summary Statements

This section of the report describes how well students met performance standards in the eleven diploma examination courses. Each summary statement addresses three questions:

- What are the characteristics of the student population that wrote the examinations?
- What is the overall performance of students on the examinations?
- Do the population and performance data reveal any significant trends?

Consistent with most of the data presented in Sections 2 through 5, the data in this section of the report are based only on the results of students who had both diploma examination and school-awarded marks.

Consequently, the figures provided here are slightly different from Figure 2-2 on page 3, which describes a broader population.

English 30

What are the characteristics of the student population that wrote the examinations?

In 1997–98, 22 461 students with corresponding school-awarded marks wrote the English 30 diploma examinations. This number, representing approximately 65% of all students writing English 30 or English 33 diploma examinations in 1997–98, has increased by 354 (1.6%) students since 1996–97.

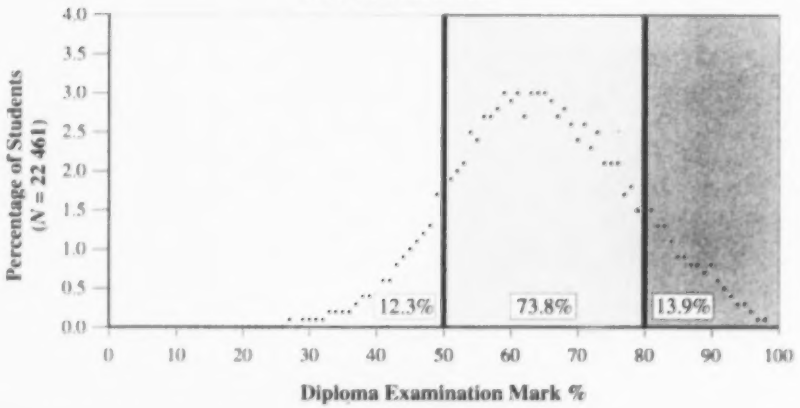
English 30 is a course "appropriate for students intending to pursue further academic studies" (*Senior High School Language Arts 1982 Curriculum Guide*, page 6).

The English 30 population comprises more females than males. About 56% of students writing the English 30 diploma examinations are female; 44% are male (see Section 3).

In the last three years, about 8.3% of those writing English 30 were atypical in that they were either repeating English 30 or challenging English 30. Special studies have shown that students who rewrite English 30 without instruction usually do not improve their marks, although students who rewrite with instruction in courses other than English score average mark increases of 5 to 10%. Students who choose to challenge the examination without classroom instruction usually pass the examination but often do not achieve marks high enough to gain entrance to further academic studies.

Figure 7-1

English 30
Distribution of Diploma Examination Marks
1997–98 School Year



What is the overall performance of students on the examinations?

The overall performance of students writing the English 30 diploma examinations during 1997–98 was similar to that in previous years. In 1997–98, a significant proportion of the students writing English 30 (87.7%) attained diploma examination marks at or above the *acceptable standard*, and 13.9% attained diploma examination marks at or above the *standard of excellence* (see Figure 6-1). Although 12.3% did not achieve the *acceptable standard*, most of these students (9.8% of all students) attained marks ranging from 40% to 49%. Some of these students might achieve the *acceptable standard* if they were to receive further instruction.

Acceptable Standard

Students who achieved at or slightly above the *acceptable standard* on the Minor Assignment: Reader's Response to Literature were able to recognize the

central metaphor in the reading selection presented in *Part A: Written Response*. Most students were able to discuss the implications of the theme in terms of human behaviour. For the most part, their writing was organized effectively.

In responding to the Major Assignment, students achieving at or slightly above the *acceptable standard* presented a clear controlling idea that reflected a basic understanding of the chosen literary work, but not always an understanding of the author's purpose or the wider implications of the literature. That is, students located a character or characters who illustrated a quality suggested by the topic, but they usually did not explore what the author was saying through that character.

Students achieving at or slightly above the *acceptable standard* organized their writing in a mechanical or functional way, giving clear direction to the reader. Although these students often simply recounted parts of the story, many understood the requirements of the assignment and successfully focused their discussion on relevant supporting details. Students writing at this standard usually used language in a correct, practical way to "get the job done" rather than to enhance the details that they were communicating or to illustrate ideas for the reader.

As in the past, students at this standard continued to demonstrate some awareness of control of the stylistic choices and the conventions of written language. While such problems as pronoun–antecedent agreement and subject–verb agreement did appear in the writing, more pervasive and serious were errors involving word usage and confusion of syntax. However, the fact that students with final course marks in the mid-range (60% to 70%) can and do produce some well-written sentences suggests that they have the potential to move from "acceptable" to "proficient" in their writing.

In responding to *Part B: Reading*, students who achieved at or slightly above the *acceptable standard* demonstrated that they were generally capable of effective close reading and of understanding difficult material, especially non-fiction. These students were often unsuccessful, however, on vocabulary and other complex questions requiring closer examination, recognition of contextual clues, and rereading of the passage.

Standard of Excellence

Students who achieved the *standard of excellence* on *Part A: Written Response* produced writing that displayed confidence in ideas, organization, and choice of language. Writing at this standard reflected a sensitivity to the emotional tone of the reading selection and also reflected an appreciation of the importance of lively, concrete detail in personal responses. Often, there was a mature understanding of the significance of the topic within the greater scope of human endeavor.

In responding to the Major Assignment, students at this standard of achievement demonstrated a perceptive understanding of literature. They were able to use the topic as a springboard to a focused, engaging, thorough examination of a chosen work of literature. Students who achieved the *standard of excellence* were confident but thoughtful in presenting their ideas and opinions. In responding to *Part B: Reading*, students achieving the *standard of excellence* demonstrated that they had highly developed skills in close reading. These students also achieved noticeably higher scores on questions requiring competence in vocabulary. Students at this standard were successful at reading critically and responding precisely to complex literary works such as Shakespearean drama and poetry dense with imagery.

Do the population and performance data reveal any significant trends?

Table 7-1 provides a comparison over the last five years of selected population and performance indicators. The number of students writing the diploma examination in English 30 dropped in 1994–95 and 1995–96, but recovered somewhat in 1996–97 and continued to increase in 1997–98. This may be a reflection of a trend toward retraining and restructuring in the workforce.

Table 7-1

English 30
Five-Year Comparison of Selected Population and Achievement Indicators

	1993–94	1994–95	1995–96	1996–97	1997–98
Number of Students with a School-Awarded Mark	24 494	23 074	21 604	22 107	22 461
Male/Female Proportions (%)	45/55	45/55	45/55	44/56	44/56
Students Achieving *Acceptable Standard* on Diploma Exam (%)	87.2	87.2	91.4	88.0	87.7
Students Achieving *Standard of Excellence* on Diploma Exam (%)	10.4	12.7	16.0	13.9	13.9

English 33

What are the characteristics of the student population that wrote the examinations?

In 1997–98, 12 316 students with corresponding school-awarded marks wrote the English 33 diploma examinations. This is approximately 35% of all such students who wrote the English 30 or English 33 diploma examinations in 1997–98. Generally, students who write English 33 write few, if any, other diploma examinations (see Figure 2-3).

English 33 is a course "appropriate for students intending to go to vocational school or to seek employment after leaving high school" (*Senior High School Language Arts 1982 Curriculum Guide*, page 6). The fact that so few English 33 students were enrolled in other diploma examination courses may indicate that these students did, indeed, plan to enter the workforce immediately upon graduation.

In 1997–98, as in previous years, English 33 was selected by more male (56%) students than female (44%) students.

What is the overall performance of students on the examinations?

The overall performance of the 12 316 students with corresponding school-awarded marks who wrote the English 33 diploma examinations this past school year was consistant with previous years. In 1997–98, 87.4% of students writing English 33 attained diploma examination marks at or above the *acceptable standard* and 7.6% attained diploma examination marks at or above the *standard of excellence* (see Figure 7-2). The proportion of students who did not achieve the *acceptable standard* was 12.6%, but 10.3% attained marks ranging from 40% to 49%. Only 2.3% of the students attained marks of 39% or lower.

Acceptable Standard

Students who achieved at or slightly above the *acceptable standard* were able to respond clearly and correctly to all three assignments in *Part A: Written Response*. They demonstrated a clear understanding of the reading selection in their responses to Section I: Personal Response to Literature, and they addressed the assignment in a conventional manner. These students discussed life experiences and themes of understanding in the reading selection in their responses to this section in perfunctory but acceptable ways.

Students achieving at or slightly above the *acceptable standard* provided satisfactory responses to Section II: Functional Writing. These students used the information provided in the assignment to fulfill their purposes sufficiently and were able to adopt an appropriate tone that demonstrated an awareness of audience. They were able to organize their work logically and clearly.

When responding to Section III: Response to Visual Communication, these students tended to interpret the photograph in conventional ways, using generalized observations for support. Students who just met the *acceptable standard* on *Part A: Written Response* provided few specific details in their writing. Writing skills demonstrated by these students were minimally acceptable.

In responding to *Part B: Reading*, students who achieved at or slightly above the *acceptable standard* were able to understand reading selections that were intended for a general audience. They were able to draw some inferences from context and to apply basic concepts such as metaphor and foreshadowing. However, these students had difficulty understanding and interpreting irony and other tonal qualities.

In responding to the revision assignments on *Part B: Reading*, in which students were required to make decisions about appropriate revisions to the draft of a letter, many students achieving at or slightly above the *acceptable standard* appeared to understand the rationale behind revisions in areas such as syntax, diction, and conventions. What was discouraging was that many of these students did not transfer this apparent understanding to their own writing on *Part A: Written Response*.

Standard of Excellence

Students who achieved the *standard of excellence* generally produced work of superior quality on all of the assignments in *Part A: Written Response*. When responding to Section I: Personal Response to Literature, students at this standard usually interpreted the assignment in an insightful way. They presented significant themes or ideas and used precise examples from life and literature to support their themes. Many of these students responded to the universal implications of the selections and explored topics in a perceptive manner. These students used precise, thoughtfully chosen, and often imaginative details. They were able to select examples and illustrations from reading selections, from their own experience, and from other literature to fulfill their purpose. Their writing was focused, coherent, and smoothly developed. They used words and structures that were effective and basically free from errors. These students projected confidence in their writing.

When responding to Section II: Functional Writing, students achieving the *standard of excellence* used an appropriate and engaging tone. They provided significant information that was enhanced by appropriate details. These students had a precise awareness of audience, and they provided important and essential information necessary for their purpose. Writing skills demonstrated at this level were relatively even; word choice and sentence structure were appropriate and often effective, and there were few errors in mechanics and grammar.

When responding to Section III: Response to Visual Communication, students achieving the *standard of excellence* presented insightful interpretations of the photograph, stating appropriate themes or ideas. Their ideas were typically extended

and reinforced throughout their compositions. These students chose specific elements from the photograph to support their ideas. They made few mechanical or grammatical errors and produced relatively lengthy responses.

When responding to *Part B: Reading*, students achieving the *standard of excellence* demonstrated an understanding of relatively complicated literature. They were able to delve beyond the literal level of a work to make inferences from important features such as irony and symbolism. These students demonstrated that they read carefully and thoughtfully the selections and all parts of each question before answering.

Do the population and performance data reveal any significant trends?

Table 7-2 provides a comparison over the last five school years of selected population and performance indicators.

The proportion of male and female students writing the English 33 diploma examinations has remained relatively constant over the past five years, but the difference in proportion is unusual for diploma examination subjects (see Figure 3-1).

The proportion of students achieving the *acceptable standard* in English 33 declined between 1994–95 and 1995–96, but increased between 1995–96 and 1997–98. There is a notable increase in the proportion of students achieving the *standard of excellence*; however, this does not yet meet the target of 15%.

Figure 7-2

English 33
Distribution of Diploma Examination Marks
1997–98 School Year

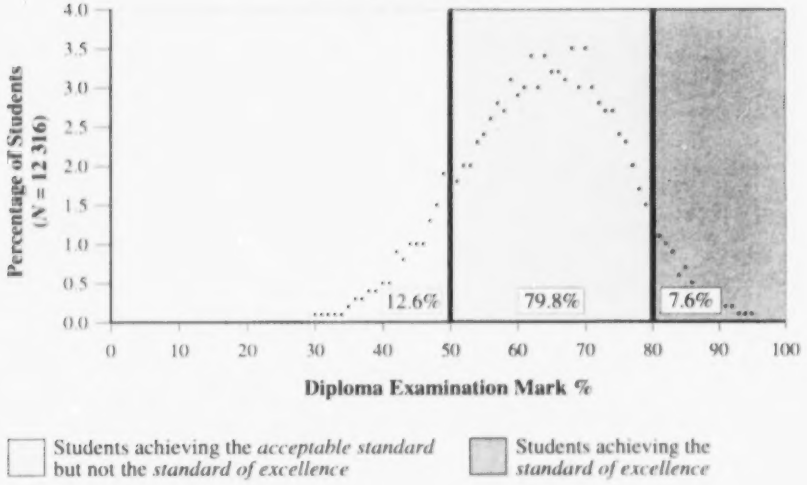


Table 7-2

English 33
Five-Year Comparison of Selected Population and Achievement Indicators

	1993–94	1994–95	1995–96	1996–97	1997–98
Number of Students with a School-Awarded Mark	11 020	11 613	11 381	12 679	12 316
Male/Female Proportions (%)	56/44	56/44	56/44	56/44	56/44
Students Achieving *Acceptable Standard* on Diploma Exam (%)	85.0	86.1	85.6	86.2	87.4
Students Achieving *Standard of Excellence* on Diploma Exam (%)	5.1	5.1	6.9	7.1	7.6

Social Studies 30

What are the characteristics of the student population that wrote the examinations?

In 1997–98, 19 095 students with corresponding school-awarded marks wrote the Social Studies 30 diploma examinations. Generally, students writing Social Studies 30 also wrote other diploma examinations (see Figure 2-3). There is also a high correlation (0.748) between Social Studies 30 school-awarded marks and Social Studies 30 diploma examination marks (see Section 2, Table 2-1).

Social Studies 30 is a course designed for those students who are seeking a diploma and who will likely pursue academic post-secondary studies. The fact that many Social Studies 30 students took other diploma examination courses may indicate that most of these students plan to enter post-secondary institutions upon graduation.

Social Studies 30 was selected by more female than male students. In 1997–98, 9 972 female students and 9 123 male students wrote the Social Studies 30 diploma examinations.

What is the overall performance of students on the examinations?

The overall performance of the 19 095 students with corresponding school-awarded marks who wrote the Social Studies 30 diploma examinations was consistent with previous year's performance. In 1997–98, 83.9% of the students writing Social Studies 30 attained diploma examination marks at or above the *acceptable standard*, and 16.5% of the students attained diploma examination marks at or above the *standard of excellence* (see Figure 7-3). The proportion of students who did not achieve the *acceptable standard* was 16.1%, but 12.0% of students attained marks ranging from 40% to 49%. The percentage of students whose marks were 39% or lower was 4.1%.

Acceptable Standard

In answering the multiple-choice questions in Part A of the examination, students who achieved at or slightly above the *acceptable standard* were able to recall and comprehend certain historical events or economic and political concepts. Students just meeting the *acceptable standard* experienced difficulty, however, with questions involving chronology, various critical thinking skills, and the application of knowledge to new or unfamiliar situations. In particular, these students experienced difficulty with textual or data-based questions (such as those involving a cartoon, graph, map, or series of quotations) that required them to see relationships, interpret trends, understand cause and effect, or identify stated or unstated assumptions.

Many students who just met the *acceptable standard* had difficulty dealing with the complexity of the task on *Part B: Written Response*. Typically, these students presented largely descriptive essays containing both relevant and irrelevant detail. Many students who just met or who fell short of the *acceptable standard* had difficulty applying and integrating concepts and defining the issues. They appear to have rushed headlong into their writing, without planning their essays or considering the relevance of historical or contemporary examples associated with the issues under discussion.

Students who fell short of the *acceptable standard* often presented memorized information at random, rather than a thought-out discussion. They left the task of sorting out scattered facts to the reader. They presented popularly accepted versions of past or present events as unsupported, simple assertions. They often made little attempt to elaborate, explain, or develop ideas. Such writing received low scores.

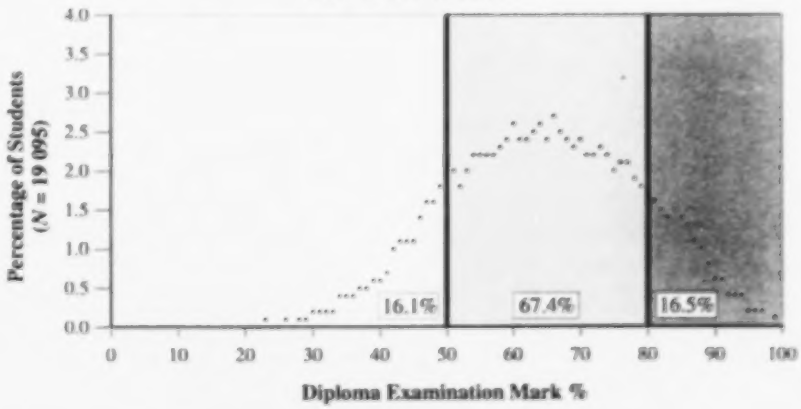
Standard of Excellence

In answering the multiple-choice questions in Part A, students achieving the *standard of excellence* demonstrated that they understood social studies concepts and comprehended historical, political, and economic relationships, many of which are very complex. They were consistently able to interpret and evaluate information and ideas, and to apply, analyze, and synthesize specific information.

Students who achieved the *standard of excellence* often produced powerful and substantive writing in their responses to the assignment in *Part B: Written Response*. Given the complexity of the task and the constraints of time, some of these

Figure 7-3

Social Studies 30
Distribution of Diploma Examination Marks
1997–98 School Year



students' compositions were truly remarkable. Many of the responses of students achieving at this standard revealed qualities of argument, support, development, and organization that exhibited a breadth of historical and contemporary knowledge. Students achieving the *standard of excellence* clearly showed ownership of the ideas they expressed; their writing revealed engaged minds thoughtfully immersed in issues relevant and meaningful to them. These students were comfortable in exploring ideas in their complexity.

Do the population and performance data reveal any significant trends?

Table 7-3 provides a comparison over the last five school years of selected population and performance indicators.

The number of students writing Social Studies 30 diploma examinations declined significantly from past administrations. Between 1993–94 and 1997–98, for example, this decrease was 10.6%. This decrease may, in large part, be attributable to the number of students now electing to take Social Studies 33 rather than Social Studies 30. The proportion of male and female students writing and the two performance indicators have remained relatively constant (see Table 7-3).

Although more females than males wrote the diploma examination in Social Studies, males continued to achieve higher averages than females: 66.5% compared with 62.1% in 1996–97, and 66.0% compared with 63.0% in 1997–98. On the multiple-choice component in particular, males consistently achieve higher average scores than females: 69.6% compared with 64.4% in 1997–98. This difference is not evident in the written response, where the averages in 1997–98 were 57.7% for males and 59.3% for females.

Revisions to the examination blueprint, beginning in 1990, have emphasized the demonstration of demanding critical thinking skills in both parts of the examination. Even so, student performance on the Social Studies 30 Diploma examination is improving (see page 28, Achievement-Over-Time). This gradual improvement has not yet contributed to substantial change in the proportions of students achieving the standards (see chart below).

Table 7-3

Social Studies 30

Five-Year Comparison of Selected Population and Achievement Indicators

	1993–94	1994–95	1995–96	1996–97	1997–98
Number of Students with a School-Awarded Mark	21 351	19 745	19 646	19 209	19 095
Male/Female Proportions (%)	47/53	47/53	47/53	47/53	48/52
Students Achieving *Acceptable Standard* on Diploma Exam (%)	83.7	83.7	84.2	83.7	83.9
Students Achieving *Standard of Excellence* on Diploma Exam (%)	14.5	15.7	17.7	15.6	16.5

Social Studies 33

What are the characteristics of the student population that wrote the examinations?

Diploma examinations in Social Studies 33 were administered for the third time in the 1997–98 school year. These examinations were written by 13 520 students with corresponding school-awarded marks. Generally, students who wrote the Social Studies 33 examinations also wrote several other diploma examinations; however, the average number of diploma examinations written by these students was lower than that for most other diploma examination courses. Social Studies 33 is a course designed for students intending to seek employment immediately after completing high school or for students planning to attend a post-secondary education institution and to major in a field other than the social sciences. The fact that Social Studies 33 students were enrolled in few other diploma examination courses may indicate that many of these students did, indeed, plan to enter the workforce upon completion of high school.

In 1997–98, Social Studies 33 was selected by slightly more male students than female students.

What is the overall performance of students on the examinations?

The overall performance of the 13 520 students with corresponding school-awarded marks who wrote the Social Studies 33 diploma examinations was satisfactory. However, students' performance does not yet meet the goal of 85% at or above the *acceptable standard* and 15% at the *standard of excellence*. In 1997–98, the *acceptable standard* was achieved by 83.5% of students who wrote the Social Studies 33 diploma examination, and the *standard of excellence* by 9.3%. The proportion of students who did not achieve the *acceptable standard* was 16.5%, but 11.9% attained marks ranging from 40% to 49%. Only 4.6% of students attained marks of 39% or lower.

Acceptable Standard

In answering the multiple-choice questions, students at or slightly above the *acceptable standard* were able to recall and comprehend some historical events and basic political and economic concepts. They were also able to interpret and apply ideas and information presented in multiple-choice question data sources, although success diminished for the more complex and challenging sources and associated questions.

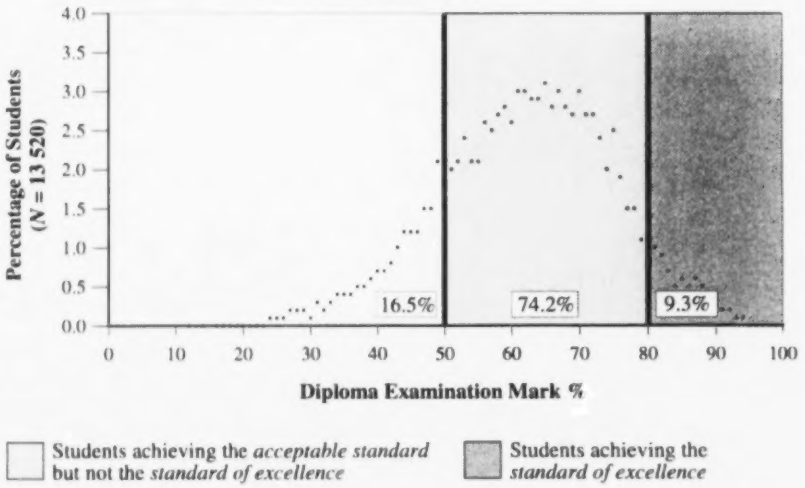
The majority of students who achieved at or slightly above the *acceptable standard* responded to each of the four writing assignments on their examination. The written work of these students showed that they had a basic understanding of social studies concepts and their application in real-world situations. It was relatively common for students at or slightly above the *acceptable standard* to correctly recall and apply factual information but to lack the breadth and depth of knowledge demonstrated by students achieving the *standard of excellence*. Responses were sincere, with many students developing links between the writing tasks and their own lives. Students who achieved at or slightly above the *acceptable standard* demonstrated satisfactory written communication skills. Written works typically contained appropriate but generalized vocabulary. Students at this standard demonstrated satisfactory control of sentence construction, grammar, and mechanics. Overall, such works were functionally organized and the student's meaning was relatively clear. On the writing assignments, student scores for the *Communication of Ideas* scoring category were, as a rule, slightly higher than for the *Ideas and Support* scoring category.

Standard of Excellence

In answering the multiple-choice questions in Part A, students achieving the *standard of excellence* demonstrated that they understood social studies concepts and comprehended fundamental historical, political, and economic relationships. They were able to interpret and evaluate information presented in relatively complex multiple-choice data sources with minimal difficulty.

Figure 7-4

Social Studies 33
Distribution of Diploma Examination Marks
1997–98 School Year



The written compositions of students achieving the *standard of excellence* typically provided a more panoramic perspective than the written compositions of students achieving at or slightly above the *acceptable standard*. Students achieving the *standard of excellence* not only developed links between a writing task and their own lives but also typically expanded upon this base to discuss the broader implications related to the task. Students at the *standard of excellence* demonstrated competent-to-excellent written communication skills. These students were able to use specific and appropriate vocabulary, and demonstrated confident control of sentence construction, grammar, and mechanics. The compositions of students achieving the *standard of excellence* were effectively organized, and students wrote so that their meaning was easily understood.

Do the population and performance data reveal any significant trends?

Given that Social Studies 33 diploma examinations have been administered for only three years, it is premature to discuss any significant trends. Student achievement in the first years of administration has clearly met the expectations of the educational professionals involved in designing the examination and in applying the standards used to evaluate student achievement. Professionals anticipate that students will continue to improve their performance and come closer to meeting the goal of 85% at or above the *acceptable standard*.

It is interesting to note that in the 1996–97 school year there was only a slight increase in the total number of students writing the examination. In the 1997–98 school year, the total number of examinations written was 13 520, an increase of only 3.2% over 1996–97. This increase is small compared with the 9.1% increase experienced between the 1995–96 and the 1996–97 school years.

Table 7-4

Social Studies 33
Three-Year Comparison of Selected Population and Achievement Indicators

	1995–96	1996–97	1997–98
Number of Students with a School-Awarded Mark	11 894	13 095	13 520
Male/Female Proportions (%)	52/48	51/49	51/49
Students Achieving *Acceptable Standard* on Diploma Exam (%)	83.1	80.8	83.5
Students Achieving *Standard of Excellence* on Diploma Exam (%)	7.9	6.8	9.3

Français 30

What are the characteristics of the student population that wrote the examinations?

Français 30 is the final course of the *Français 10-20-30 program* designed for francophone students as defined in Section 23 of the *Canadian Charter of Rights and Freedoms*. Students enrolled in Français 30 are required to write the Français 30 Diploma Examination.

In the 1997–98 school year, there were 86 regular school students who wrote the Français 30 diploma examinations. One mature student wrote the Français 30 examination and 15 students from other programs challenged the Français 30 diploma examinations, for a total of 102 written examinations. Because very few students wrote at each administration, results must be interpreted with caution.

What is the overall performance of students on the examinations?

The overall performance of the 86 regular school students who wrote the Français 30 diploma examinations in the 1997–98 school year was very good. All but one attained final course marks at or above the *acceptable standard*, and eight achieved the *standard of excellence*.

Most of the students enrolled in Français 30 wrote an average of five diploma examinations. This indicates that most of these students were hoping to receive the Advanced High School Diploma.

La Partie A: Production écrite

The written-response section of the Français 30 diploma examinations required students to write two assignments related to a selection from a work of literature presented on the examination. The first assignment, "Premier sujet," elicited a personal response to the selection. The second, "Deuxième sujet," asked students to select a work of literature studied in their high school Français courses and to relate it to a given theme inspired by the selection presented on the examination.

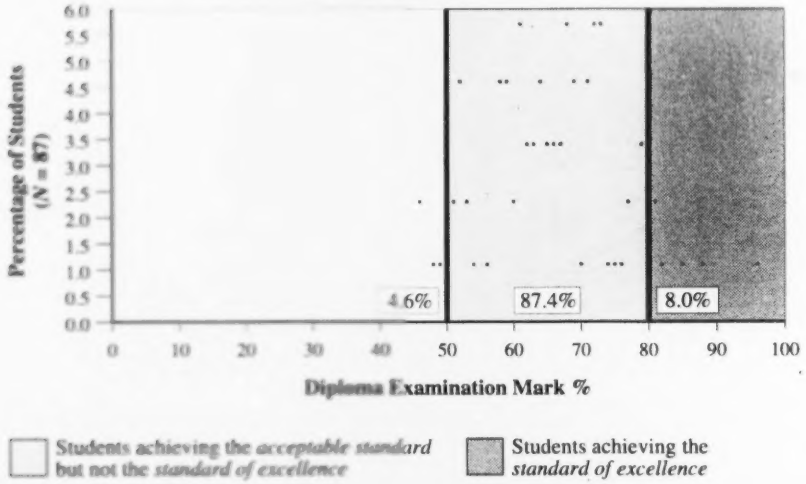
Students were able to understand the tone and content of the given literature and to respond clearly and effectively. For the personal response, they expressed their opinions and reactions with confidence. Most took the more obvious approach to the question by supporting the given theme, and a few were able to present an opposing view successfully. Examples taken from their own experiences or from general observations were usually appropriate and often interesting. Although the writing of students just meeting the *acceptable standard* was sometimes wordy and repetitious, the meaning was clearly understandable. Students achieving the *standard of excellence* were able to present their ideas succinctly, directly, and emphatically.

In the second assignment, students had no difficulty selecting works that reflected the given theme. Students achieving the *standard of excellence* used significant details from chosen literature to show how the given theme was developed by the author or authors. Students just meeting the *acceptable standard* tended to choose more minor details or to repeat one significant detail, with less effect. All students, however, were able to convince the readers of the relationship between what they had read and what the assignment required. Students have learned well how to organize their ideas, how to choose effective vocabulary and structures, and how to follow conventions of language in general.

It must be remembered that students are writing in a limited time under examination conditions and that their work is considered a first draft. Under these conditions, what they achieved was impressive and often a pleasure to read.

Figure 7-5

Français 30
Distribution of Diploma Examination Marks
1997–98 School Year



La Partie B: Compréhension écrite

The reading comprehension section of the Français 30 diploma examinations consisted of two booklets. The readings booklet contained selections from fiction, non-fiction, poetry, and drama. The questions booklet contained 70 multiple-choice questions based on these readings. The questions were classified according to thinking skills.

Students' performance was generally satisfactory. They were able to identify and select, infer, interpret, and evaluate main ideas. They were also able to recognize the author's purpose, as well as to discern values expressed. Students achieving the *standard of excellence* seemed better able to discern the nuances required to choose the right answer in some questions. Students achieving the *acceptable standard* usually did well on the questions requiring a literal understanding. These students should be encouraged to refer back to the reading selections when contemplating their choice of answers. This could help them to perceive more of the nuances of the text.

Do the population and performance data reveal any significant trends?

Because the number of students enrolled in the course is extremely small, no comments can be made on trends in the data.

Mathematics 30

What are the characteristics of the student population that wrote the examinations?

Mathematics 30 is a course "designed for students with an interest and aptitude in mathematics, who are intending to pursue post-secondary studies at a university or in a mathematics-intensive program at a technical school or college." (Senior High School Mathematics 10-20-30 Curriculum Guide, page 2).

In 1997–98, 18 531 students with corresponding school-awarded marks wrote the Mathematics 30 diploma examinations. This is an increase of 285 students since 1996–97. The Mathematics 30 population comprises slightly more females than males: about 50.5% females compared with 49.5% males.

What is the overall performance of students on the examinations?

Of the students writing Mathematics 30 in 1997–98, 82.1% attained diploma examination marks at or above the *acceptable standard*, which is 7.0% higher than in the 1996–97 school year, and 7.8% higher than in the 1995–96 school year.

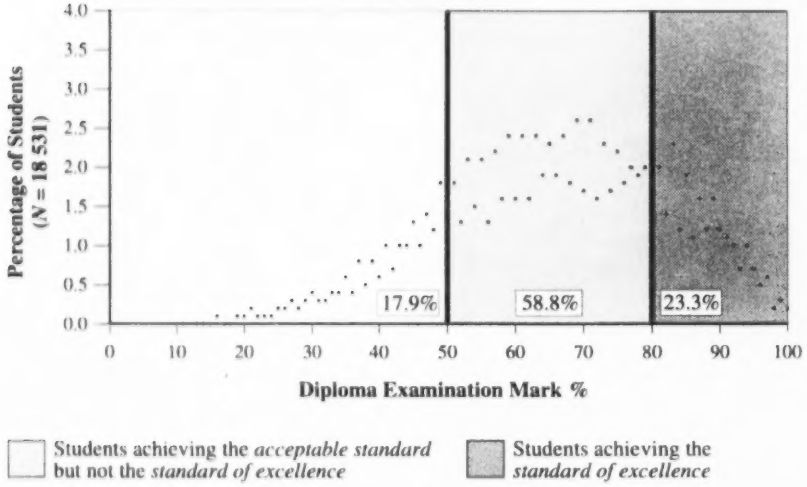
The percentage of students who achieved the *standard of excellence* rose significantly from 19.2% in 1996–97 to 23.3% in 1997–98 (see Figure 7-6). During the 1997–98 administrations, 17.9% of the students did not achieve the *acceptable standard*, a decrease of 7.0% from the 1996–97 administration (see Figure 2-14) and a decrease of 7.8% from the 1995–96 administration.

Non-mature students with a school-awarded mark scored an average of 66.7%, whereas non-mature students with a school mark brought forward scored an average of 66.6%. Mature students with a school-awarded mark scored an average of 58.1%; whereas mature school students with a school mark brought forward scored an average of 52.1%. Mature students who challenged the examination scored an average of 48.9% (see Table 4-14).

Standards for the Mathematics 30 diploma examinations for the 1997–98 school year were published in the *Mathematics 30 Diploma Examination Information Bulletin*. The emphases on problem solving and communication skills in the Mathematics 30 curriculum were incorporated into the examination. Students were expected to describe mathematical situations, explain their solutions and their reasoning, create new problems and strategies, generalize a mathematical situation, and formulate hypotheses. The Mathematics 30 examiners' reports outline the scoring criteria for these questions.

Figure 7-6

Mathematics 30
Distribution of Diploma Examination Marks
1997–98 School Year



52

Acceptable Standard

Students who achieved the *acceptable standard* of performance but not the *standard of excellence* (58.8%) were able to solve problems involving more than one step as long as the information provided was given in a "standard" form and could be referenced on the formula sheet. In permutations and combinations, for instance, students were able to calculate the number of linear, circle, or ring permutations, and permutations with repetitions of n things taken r at a time, but were not able to explain the reason that there are different numbers of permutations when a given number of objects is arranged in a line, a circle, or a ring, or when some of the objects are repeated or identical. For the most part, students in this group were able to recognize relationships between mathematical concepts, but only so long as these relationships were presented in a specific sense. Many were not able to identify the relationships in the general case. For example, these students were able to write the specific terms of an arithmetic or geometric sequence, given a defining function, but were not able to determine a function describing any sequence that has a recognizable pattern, nor were they able to identify and explain conditions necessary for a sequence to meet given requirements.

Students who did not achieve the *acceptable standard* of performance on the Mathematics 30 diploma examinations (17.9%) had difficulty solving problems other than those that required solving for a single piece of information using a formula provided on the formula sheet. These students were able to solve problems that required a one-step calculation, such as finding the value of a z-score, given the values of the variables required to substitute into a given formula. However, these students were not able to complete multistep problems that required them to apply the z-scores of data normally distributed, such as the example given in the standards section of the *Mathematics 30 Information Bulletin*.

Standard of Excellence

Students who achieved the *standard of excellence* in Mathematics 30 (23.3%) had little difficulty solving any problems, regardless of the number of steps required. They recognized and were able to describe relationships between mathematical concepts in both the specific and the general cases. For example, given the first term and the fifth term of a geometric sequence in the context of a problem, students who achieved at the *standard of excellence* were able not only to algebraically determine specific answers to the problem, but were also able to clearly identify and explain, in a general manner, an expression for the total cost of n tiers. (Written Response 2, Mathematics 30 January 1998 Diploma Examination.)

Do the population and performance *data reveal any significant trends?*

There has been an increase in the student population scoring at the *acceptable standard* on the diploma examination since 1994–95 as well as an increase in the student population scoring at the *standard of excellence*.

On the written-response section of the examination, students achieving at the *acceptable standard* demonstrate *some understanding* of the problem, formulate *some aspect* of the problem mathematically, and demonstrate the use of a strategy that required mathematical knowledge and problem-solving techniques to find a *partial* solution. However, they demonstrate little understanding of the complexities of the problem, and the written-response section of the diploma examination continues to be an area where students will be required to show improvement in their solutions.

Mathematics 33

What are the characteristics of the student population that wrote the examinations?

Mathematics 33 is a course "designed for students who require mathematics to prepare them for many post-secondary programs at university, colleges, trades, and employment" (Senior High School Mathematics 13-23-33 Course of Studies, page 2).

The Mathematics 33 examination has been designed to include scenarios that allow students to demonstrate their required mathematical understandings in situations similar to those they will encounter in post-secondary programs, colleges, trades, employment, and real life.

In the 1997–98 school year, 11 588 students with corresponding school-awarded marks wrote the Mathematics 33 diploma examinations. This is up approximately 250 students from the previous year. This year, about 51.2% of students writing Mathematics 33 diploma examinations were female; 48.8% were male.

What is the overall performance of students on the examinations?

In 1997–98, 73.5% of the students writing Mathematics 33 attained diploma examination marks at or above the *acceptable standard*. The percentage of students who achieved the *standard of excellence* was 11.4%. During the 1998 administration, 26.5% of the students did not achieve the *acceptable standard*.

Of students writing the examination, 87.3% were non-mature and 12.7% were mature students with school-awarded marks. Only 3.2% of the students who wrote the Mathematics 33 diploma examinations were either challenging or had school marks brought forward. Non-mature students with a school mark scored an average of 59.8%, whereas non-mature students with a school-mark brought forward scored an average of 49.5%. Mature students with a school-awarded mark who wrote the examination scored an average of 59.2%, whereas the 21 mature students who had a school mark brought forward scored

an average of 43.9%. Mature students who challenged the examination scored an average of 52.2% (see Table 4-17).

Standards for the Mathematics 33 diploma examinations for the 1997–98 school year were published in the *Mathematics 33 Diploma Examination Information Bulletin*.

In the 1997–98 school year, students demonstrated strength on routine and non-routine conceptual, procedural, and problem-solving tasks. These tasks were related to the standards and embedded within real-life contexts. Students successfully applied their mathematical understandings and articulated their mathematical abilities in performing tasks. Student responses to written questions demonstrated strengths in reasoning, analysis, formulating inferences, organizing/explaining solutions, and problem solving. The Mathematics 33 examiners' reports outline student success on written-response questions, as well as on machine-scored questions related to these expectations.

Acceptable Standard

Almost the same percentage of students achieved the *acceptable standard* of performance this year (62.1%) as did last year (63.5%). These students were able to solve problems written in both pure and applied contexts that involved demonstrating conceptual and/or procedural understandings.

Students who did not achieve the *acceptable standard* of performance on the Mathematics 33 diploma examinations (26.5%) had difficulty solving problems that required the simple applications of conceptual and procedural understandings. Typically, they could not solve routine questions that require understanding of simple concepts or procedures.

Standard of Excellence

Students who achieved the *standard of excellence* in Mathematics 33 (11.4%) had little difficulty solving problems and typically excelled at multistep tasks. They were able to do non-routine tasks readily.

As well, they were able to formulate solutions, inferences, or generalizations from data, equations, graphs, and other non-routine situations that presented themselves.

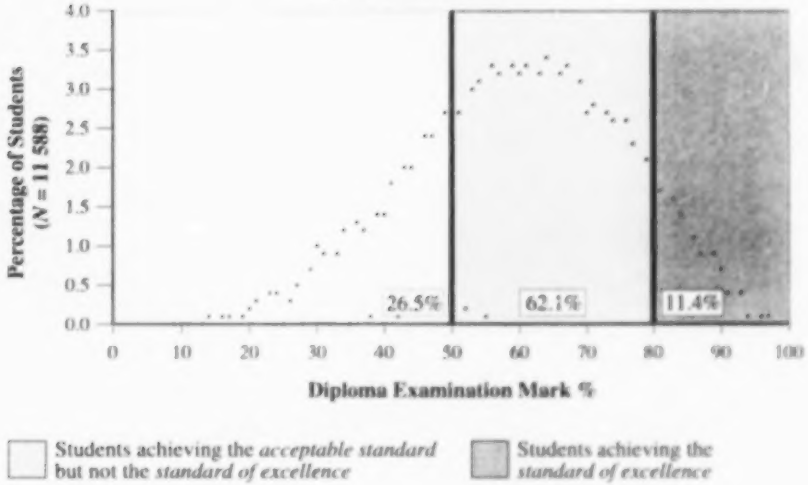
Do the population and performance data reveal any significant trends?

This was the third year that Mathematics 33 diploma examinations were administered. The results of the third year appear to be somewhat lower than those of the first two years, when averages are compared. More students were unable to meet the *acceptable standard*. Teachers marking the examinations noted their satisfaction in the ways in which students are responding to the machine-scored questions but are concerned about the poorer responses by students in the written-response section of the examination. These concerns were also addressed in this year's Examiners' Reports and were shared with teachers at the annual Alberta Teachers' Mathematics Conference.

All stakeholders are pleased with the examination and its format and endorsed the use and recognition of partnerships in developing real-life contexts. The trend to use business and post-secondary partners in hosting teachers in the development of examination items has resulted in the growing recognition, improvement, and endorsement of students entering post-secondary opportunities. In summary, the various stakeholders stated that there is a significant improvement in attitudes and teacher expectations, when compared with years prior to the introduction of the Mathematics 33 diploma examinations.

Figure 7-7

Mathematics 33
Distribution of Diploma Examination Marks
1997–98 School Year



Biology 30

What are the characteristics of the student population that wrote the examinations?

In 1997–98, 16 436 students with corresponding school-awarded marks wrote the Biology 30 diploma examinations. This represents a decrease of 3.5% compared with 1996–97. The writing population represents approximately three-quarters of the students who wrote the English 30 diploma examination in 1997–98.

Approximately 67% of the Biology 30 population in 1997–98 completed four or more diploma examination courses.

The Biology 30 population has more females than males. About 61% of students writing Biology 30 Diploma Examinations are female; 39% are male.

What is the overall performance of students on the examinations?

The overall performance of students on the Biology 30 diploma examinations during the 1997–98 school year was consistent with previous year's performance. A good proportion of students (24.9%) achieved the *standard of excellence*. Although 19.2% of the students did not meet the *acceptable standard*, 7.0% of all students obtained marks ranging from 45% through 49%. Most of these students would likely be able to achieve the *acceptable standard* on future diploma examinations in Biology 30 if they received additional instruction.

The percentage of female and male students who achieved the *acceptable standard* on the Biology 30 diploma examinations was higher for females than males—81.2% for females and 80.1% for males. The percentage of female and male students who achieved the *standard of excellence* on the Biology 30 diploma examinations was also higher for females than males—25.2% for females and 24.3% for males. The Biology 30 diploma examinations average for females and males was also higher for females than males—66.0% for females and 65.5% for males (see Table 3-2).

Acceptable Standard

Students who achieved the *acceptable standard* but not the standard of excellence (55.9% of the population) understood most of the basic functions of the nervous and endocrine systems, reproductive systems, cell division, Mendelian genetics, and population interactions. Biological concepts such as population genetics, cell division, molecular genetics, and differention and development proved difficult.

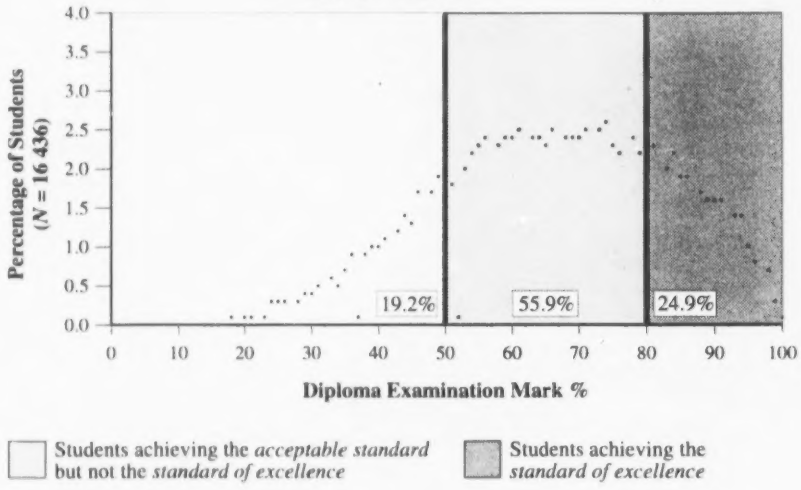
This group of students correctly interpreted data presented in simple graphs, tables, and diagrams. However, they found it difficult to interpret complex graphs and tables that presented interrelated sets of data.

They related biology concepts to simple human experiences but found it difficult to analyze multistep problems in molecular and population genetics. Questions that required the evaluation of an issue within the context of technology proved difficult for these students. The basic language of biology was understood by these students, but specialized terms that incorporate sophisticated science concepts (alleles, genes, genetic diversity, biotic potential, cross-over frequency trisomy) created problems for them. They composed one- or two-sentence answers that were clear and logical for questions that contained only one component. However, they had difficulty creating multistep, paragraph responses to problems that required the development of several ideas. Their answers to these questions frequently consisted of recalled information that did not address the central issues of the problems posed. These students did not clearly express cause-and-effect relationships.

Students who failed to achieve the *acceptable standard* (19.2%) did not understand basic functions of the nervous and endocrine structures, and had difficulty with molecular and population genetics and population interactions. They found it difficult to interpret data represented in diagrams and tables. They did not know the functional properties of key biological substances. They were unable to make predictions based on simple principles of inheritance and to sequentially organize the major steps of physiological processes. This group of students could not compose clear

Figure 7-8

Biology 30
Distribution of Diploma Examination Marks
1997–98 School Year



and logical explanations for single-component problems. Their responses indicated that they did not adequately understand the meaning of the questions.

Standard of Excellence

Students who attained the *standard of excellence* (24.9%) demonstrated consistent performance throughout the examination, whether they selected or created responses. They could recall precise knowledge about the structure and function of human organs, the mechanisms of inheritance, and populations. They could then use this knowledge to solve multistep problems. They were able to understand the chemical and neural pathways of communications, to understand all aspects of reproduction and genetics, and to arrange physiological processes in sequential order. They could perform calculations in molecular genetics and in population genetics and dynamics. They could evaluate data mathematically and conceptually to form new hypothesis or predict future trends. They were able to readily integrate new information (STS) with their knowledge of Biology 30 concepts to solve unique problems. Their compositions demonstrated a clear understanding of cause-and-effect relationships. They used scientific vocabulary with precision, presented supporting diagrams for concepts accurately, and communicated clearly.

Do the population and performance data reveal any significant trends?

From the 1993–94 school year to the 1997–98 school year, the total number of students who obtained a final course mark in Biology 30 decreased from 17 943 to 16 436.

The decrease in the total number of students who obtained a final mark in Biology 30 from 1993–94 to 1997–98 is greater for males (1 052) than females (453). Over the period of 1995–96 to 1997–98, the number of males decreased (832) while the number of females actually increased slightly (43). During this period, the number of questions on the written-response section of the examination was reduced to two questions from four in 1994–95. One of the two questions is an extended open-response question requiring analysis of new context, applying that context to course content, and communicating clearly the interrelated concepts as required. This question is significantly different from any questions on the examinations before 1995–96.

With the exception of the 1995–96 school year, the percentages of students achieving the *standard of excellence* and those achieving the *acceptable standard* have remained about the same over the five years. However, during this same period, the difference in performance by males and females at both the *standard of excellence* and the *acceptable standard* also showed an interesting trend. In 1993–94, the percentage of females achieving at the *standard of excellence* was 21.4% and the percentage of males was 25.8%, a difference of 4.4%. In 1997–98, the percentage of females and males achieving at the *standard of excellence* was almost the same: 25.2% for females and 24.3% for males, which is a difference of 0.9%. Likewise, in 1993–94, the percentage of females achieving the *acceptable standard* was 79.5% and the percentage of males was 84.1%, which is a difference of 4.6%. In 1997–98, the percentage of males and females was almost the same: 81.2% for females and 80.1% for males, a difference of 1.1%. Although males continue to do well on the examination, the gender gap has been reduced as female achievement has improved on the examination.

Although the number of students in Biology decreased by 789 from 1995–96 to 1997–98, it is not clear if these students simply took fewer science courses or if they switched science courses. During the same period (1995–96 to 1997–98), the number of students with corresponding school-awarded marks who wrote the Chemistry 30 diploma examination decreased by 96 students, the number who wrote the Physics 30 diploma examination increased by 700, and the number who wrote the Science 30 diploma examination increased by 215. Since this is an overall increase of 30 students, it seems likely that students are simply choosing to take other science courses and that males in particular have decided not to take Biology 30.

Table 7-5

Biology 30

Five-Year Comparison of Selected Population and Achievement Indicators

	1993–94	1994–95	1995–96	1996–97	1997–98
Number of Students with a School-Awarded Mark	17 943	16 941	17 225	17 033	16 436
Male/Female Proportions (%)	42/58	41/59	42/58	41/59	39/61
Students Achieving *Acceptable Standard* on Diploma Exam (%)	81.4	80.9	77.1	81.8	80.8
Students Achieving *Standard of Excellence* on Diploma Exam (%)	23.2	24.2	18.1	24.6	24.9

Chemistry 30

What are the characteristics of the student population that wrote the examinations?

In the 1997–98 school year, 166 more students with corresponding school-awarded marks (15 151) wrote the Chemistry 30 diploma examinations than in 1996–97. The male/female proportion of the writing population for Chemistry has remained relatively constant, with more female than males (see Table 7-6).

What is the overall performance of students on the examinations?

The overall performance of students who wrote the Chemistry 30 diploma examinations during the 1997–98 school year was satisfactory (see Figure 7-9). In 1997–98, 86.0% of the students writing Chemistry 30 attained diploma examination marks at or above the *acceptable standard*, which is up from 79.3% in 1996–97. A significant proportion of the students, 19.9%, attained diploma examination marks at or above the *standard of excellence* (see Figure 7-9), which is up from 17.7% in 1996–97. Of students who did not achieve the *acceptable standard*, 6.6% attained marks ranging from 44% to 49%. These students could likely achieve the *acceptable standard* with further instruction.

The percentage of female students who achieved the *acceptable standard* on the Chemistry 30 diploma examinations was 85.0%, of male students it was 87.1%. The percentage of females who achieved the *standard of excellence* on the examinations was 17.7%, of male students it was 22.2%. The average for females on the Chemistry 30 examinations was 65.0%, for males it was 66.9%.

Acceptable Standard

Students who achieved the *acceptable standard* but not the standard of excellence (66.1%) demonstrate a basic understanding of the nature of scientific investigation by designing, observing, and interpreting simple laboratory tests. They can readily interpret data that are presented in simple graphs and tables, and can translate symbolic representations into word descriptions. They can readily recognize and provide definitions for key chemical terms. They can predict the physical and chemical properities of compounds. These students can demonstrate an understanding of chemical concepts by quantitatively analyzing a variety of chemical problems that involve single steps. They are capable of balancing an equation (combustion, formation, neutralization, or redox) and solving standard stoichiometric problems based upon these equations. Following the directions in laboratory procedures does not present a problem for these students, nor does using the data booklet to extract valid information. These students can compose clear and logical descriptive or explanatory statements to answer closed-response questions that involve an individual chemistry concept.

Below Acceptable Standard

Students who did not achieve the acceptable standard of performance on the Chemistry 30 diploma examination (14.0%) can readily recognize and provide definitions for key chemical terms. They are capable of balancing an equation and performing simple, single-step calculations. They have difficulty in solving stoichiometric problems other than those involving single-step addition or subtraction problems. These students can read simple graphs and tables but are unable to transfer data to or from graphical form or to use data to predict trends, patterns, or properties. Nor were they successful in relating their understanding of chemistry into a real-world context. In general, these students had difficulty creating their responses and communicating their ideas clearly. As a result, they did not do well on the numerical and written response sections of the examination. They did, however, recognize correct statements about essential concepts and had their greatest success on the multiple-choice section of the examination.

Standard of Excellence

Students who achieve the *standard of excellence* (19.9%) in Chemistry 30 receive a final mark of 80% or higher. In addition to meeting the expectations for the *acceptable standards* of performance, these students demonstrate an interest in chemistry and can articulate chemistry concepts well. They can readily interpret interrelated sets of data such as complex graphs and tables. When presenting scientific data, they select the most appropriate form. These students can analyze and evaluate experimental designs. They can create their own laboratory procedures when given a clear definition of a problem. They can recognize weaknesses in laboratory work and can find ways to correct the weaknesses. They can write their own equations for formation, combustion, neutralization, redox reactions, and equilibrium expressions, and can solve many variations of stoichiometric problems based upon these equations. These students can demonstrate quantitative mastery on sophisticated problems. They are able to transfer what they see happening in a test tube into equation form and are able to express scientific ideas clearly. They can usually cope with problems that involve overlapping of two or more concepts. The most significant characteristic of this group is that they can solve problems of a new and unique nature and can extrapolate these solutions to higher levels of understanding. Open-ended questions are not a problem for them. These students can communicate clearly and concisely, using appropriate scientific vocabulary.

Do the population and performance data reveal any significant trends?

Overall, there was no significant improvement or decline in any curricular area. However, student performance on concepts directly related to equilibrium is not as great as on other concepts of equal challenge. The same is also true of student performance in relating concepts learned in the classroom to real-life situations. These weaknesses may be due, in part, to the sophistication of the revised chemistry curriculum.

Figure 7-9

Chemistry 30
Distribution of Diploma Examination Marks
1997–98 School Year

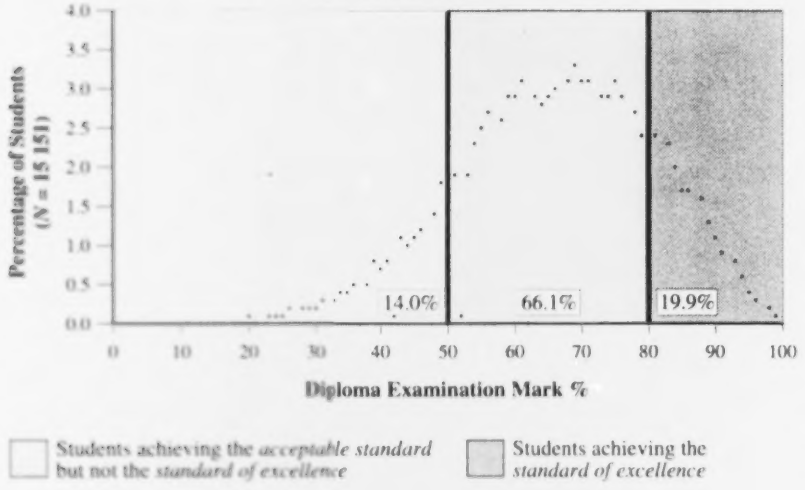


Table 7-6

Chemistry 30
Five-Year Comparison of Selected Population and Achievement Indicators

	1993–94	1994–95	1995–96	1996–97	1997–98
Number of Students with a School-Awarded Mark	14 424	14 669	15 247	14 985	15 151
Male/Female Proportions (%)	48/52	48/52	49/51	48/52	48/52
Students Achieving *Acceptable Standard* on Diploma Exam (%)	79.6	84.0	81.6	79.3	86.0
Students Achieving *Standard of Excellence* on Diploma Exam (%)	22.9	20.2	18.1	17.7	19.9

Physics 30

What are the characteristics of the student population that wrote the examinations?

In 1997–98, 8 768 students with corresponding school-awarded marks wrote the Physics 30 diploma examinations. Of these, 62.8% were male students (5 507) and 37.2% were female students (3 261). Compared with 1996–97, the participation rate for males and females has remained relatively constant.

As shown in Figure 2-3, Physics 30 students write, on average, 4.4 different diploma examinations. Only students writing Français 30 write more.

Physics 30 continues to be a course designed for students going on to academic and technological post-secondary physics and science-related programs. Registration in Physics 30 should continue to be encouraged, as many career opportunities require the knowledge and skills supported by the high school physics program.

What is the overall performance of students on the examinations?

The overall performance of students writing the Physics 30 diploma examinations during the 1997–98 school year was satisfactory (see Figure 7-10). The overall diploma results were higher than the performance in previous years (Table 7-7). In 1997–98, 6.6% more students (29.5%) achieved the *standard of excellence* than in 1996–97. The proportion of students that failed to achieve the *acceptable standard* was 14.2%, compared with the previous year's proportion of 19.5%.

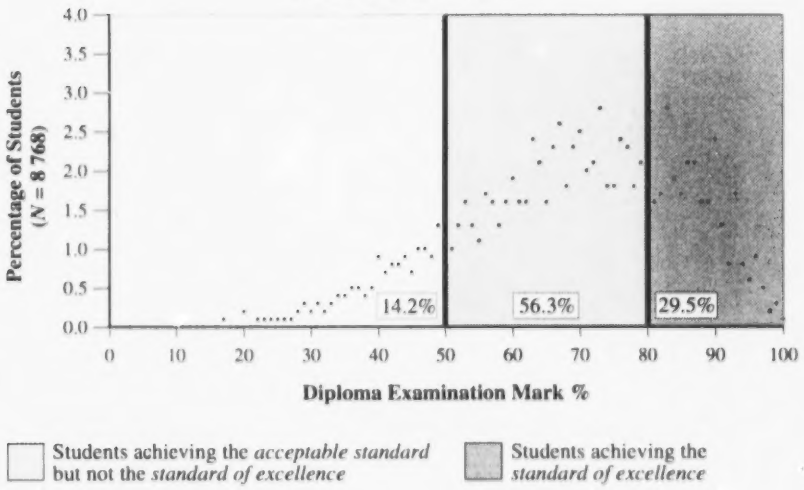
Acceptable Standard

In 1997–98, students who achieved the *acceptable standard* but not the standard of excellence (56.3%) could reliably state and solve problems that could be related quickly to an equation in the data booklet. For this group, laboratory skills were limited to using laboratory data to verify known physics information. These students were capable of producing a graph from raw data, calculating quantities such as momentum, energy, voltages, stopping voltages, centripetal force, and distances travelled by electromagnetic waves. They tended to use item-specific methods in their problem solving, and rarely used the major generalizations of physics, such as Newton's laws or those of the conservation of energy or charge. In addition, these students had difficulty communicating the physics concepts used to solve the problem. Thus, students performing near the *acceptable standard* showed only limited understanding of the full scope of the Physics 30 program of studies. Within this restricted range of content, such students performed well.

In addition, students who barely achieved the *acceptable standard* on their final course mark used the data booklet supplied more as a crutch than as a summary of the physics content. Those who achieved this standard showed that they could use the equations and information provided to solve problems requiring single-step calculations and simple two-step calculations. They were also competent in recalling facts and essential definitions related to specific concepts. Many students found it difficult to translate definitions into alternative forms and to judge whether a data book value was valid within the range of values given in a particular problem. These students had difficulty identifying a relationship between two variables that had been expressed in a graphical representation. Students achieving at this standard found it difficult to make predictions based on information or data presented. They found the multiple-choice section easier than the written-response section, and typically scored 30% higher on this section of the exam.

Figure 7-10

Physics 30
Distribution of Diploma Examination Marks
1997–98 School Year



Standard of Excellence

Students achieving the *standard of excellence* (29.5%) showed far more flexibility and creativity than those achieving the *acceptable standard* but not the standard of excellence. They

used general methods of solution and were not afraid to use conservation laws to solve unusual problems. They illustrated a transference of knowledge from one area of physics to another and expressed their answers clearly and concisely. They made inferences that were not part of their "known" area of physics. These students were able to use generalizations of physics and to distinguish between vectors and scalars or forces and fields.

In 1997–98, students who barely achieved the *standard of excellence* on their final course mark tended to use the data booklet to support their problem-solving strategies, but were not overly dependent upon it. These students stated and easily recognized relationships between variables. They were able to derive equations as needed, design procedures for a laboratory activity, and communicate effectively the procedures used to arrive at a solution. Those who achieved just below this standard had some difficulty with questions that required multistep solutions, and they needed explicit cues before they were able to use a wider range of problem-solving strategies. In many cases, such students solved more complex problems in the multiple-choice format, but experienced difficulty with similar concepts tested in a written-response format. They were adept at selecting the correct response in the multiple-choice section and in creating their own responses for similar questions in the numerical-response sections. When confronted with a problem requiring the use of two or more steps, they created their own procedures for solving problems. Many of their responses to the written-response questions showed a high level of sophistication.

Do the population and performance data reveal any significant trends?

Based on the actual results of students writing the Physics 30 diploma examinations, achievement has been fairly consistent (Table 7-7). Students continue to do well on the multiple-choice section of the examinations and continue to improve on the numerical-response section. In the written-response section, there continues to be a decrease in the number of students who leave questions blank.

Achievement has improved in some specific areas. Students have shown a marked increase in their ability to solve problems involving routine calculations. They perform well on problems requiring single-step or two-step calculations, but continue to have major difficulties using ratios. A second area of improvement is in the students' ability to deal with questions involving scenarios or technology. Students are beginning to gain confidence in their ability to apply their knowledge of physics to real-life situations. This is especially evident in the open-ended written-response questions. More students are attempting these questions, and there has been a marked improvement in their ability to organize their answers and to clearly communicate their solutions. Students are still experiencing difficulty with the concepts of electric and magnetic fields and electromagnetic induction.

Table 7-7

Physics 30
Five-Year Comparison of Selected Population and Achievement Indicators

	1993–94	1994–95	1995–96	1996–97	1997–98
Number of Students with a School-Awarded Mark	7 488	7 717	8 068	8 391	8 768
Male/Female Proportions (%)	64/36	63/37	63/37	62/38	63/37
Students Achieving *Acceptable Standard* on Diploma Exam (%)	84.8	83.7	79.7	80.5	85.8
Students Achieving *Standard of Excellence* on Diploma Exam (%)	32.3	28.2	25.7	22.9	29.5

Science 30

What are the characteristics of the student population that wrote the examinations?

In 1997–98, 1 191 students wrote the Science 30 diploma examination and received a school-awarded mark. This compares with 1 077 students in 1996–97 and 976 students in 1995–96. In the 1994–95 implementation year, there were 1 378 students who received final marks. No diploma examinations were written in the implementation year, so students received a school-awarded mark only. Such a low enrollment is disappointing because the Science 30 course is designed to give a broad science education to students who are intending to pursue post-secondary studies, but not necessarily in a science discipline. Both NAIT and SAIT have recognized the value of promoting science literacy through an integrated science course by making Science 30 a recommended prerequisite for some of their courses. SAIT has expressed interest in using the Science 30 data booklet in some of its entrance examinations. It is hoped that this kind of support and the acceptance of Science 30 by colleges and universities will encourage an increasing enrollment in Science 30 in future years.

Whereas most students who enroll in a science discipline (biology, chemistry, or physics) enroll in one or two additional science courses, only 9.15% of Science 30 students enrolled in another science course. Enrolling in Science 30 and a discipline course would give students an advantage in both subjects and a rich science experience. Such a combination would also result in a greater number of options for post-secondary study.

The Science 30 population is comprised of more males than females. About 53.7% of students writing Science 30 diploma examinations were male; 46.3% were female.

What is the overall performance of students on the examination?

In 1997–98, 83.4% of the students writing Science 30 attained the *acceptable standard*. When the examination mark was blended with the school mark, 92.1% of the students achieved the *acceptable standard*. The percentage of students who achieved the *standard of excellence* on the Science 30 diploma examinations was 11.4%.

Of the 1 202 students who wrote the examination, 68 were mature students who also received a school mark. The average of this group was 64.9%. Nine mature students challenged the examination and attained an average of 62.0%. The two non-mature students with a school mark brought forward achieved an average of 53.0%.

On the examination, the percentage of males who achieved the *acceptable standard* was 86.7% and the percentage of females was 79.5%. The percentage of males who achieved the *standard of excellence* was 11.1%; of females it was 11.8%. The average for males on the Science 30 examinations was 63.5%, compared with 62.0% for females. Although the male population seems to achieve slightly better on the examination, the reverse is true for the school-awarded mark. The blended mark for males is almost identical to that for females.

Standards for Science 30 are outlined in detail in the 1994–95 *Science 30 Information Bulletin*, pages 39 to 64. The emphases on science literacy and communication skills in the Science 30 curriculum were incorporated into the examination. On the examination, students were expected to use a data booklet to solve physics-, chemistry-, and biology-based problems, design and interpret scientific studies, provide risk–benefit analyses for some technologies, and defend a point of view on an issue related to science and society. The Science 30 Bulletin outlines the scoring criteria for these questions.

Acceptable Standard

In 1997–98, students who achieved the *acceptable standard* but not the standard of excellence (72.0%) were able to locate the appropriate information in the data booklet and use the information to answer one-step problems. Questions involving Ohm's Law, field strength, frequency, and wave length were answered correctly by these students, but they had difficulty if the questions were embedded in a context. For example, these students would be able to determine the resistance in an electrical circuit, given the amperage and voltage. They would have difficulty, however, if the circuit was presented in diagram format with the values of voltmeters and ammeters given. Many students in this group had difficulty solving titration problems. They knew the general characteristics of fission and fusion reactions, but had difficulty with mass-to-energy calculations. These students generally had a good understanding of the source of pollutants and the risks and benefits associated with various energy sources. When describing a technology and how it works, they tended to give general descriptions that lacked detail and specific examples. These students successfully interpreted simple graphs. They wrote appropriate problems and hypotheses for an experimental design, but their interpretation of scientific studies lacked depth. These students solved one-trait Mendelian crosses, but had difficulty solving problems that included x-linkage.

Students who did not achieve the *acceptable standard* of performance on the Science 30 diploma examinations (16.6%) had difficulty finding the appropriate information in the data booklet and applying it to solve a problem. They were often unable to differentiate between fission and fusion reactions. Some of the students in this group identified pollution sources and were able to give some risks and benefits associated with various energy sources. They summarized the data represented by a graph, but presented limited interpretations of graphs or

scientific studies. When presenting a problem or hypothesis, they often lacked specificity or did not concentrate on the idea behind the study. These students recalled facts about the body systems, but had difficulty with genetic crosses and feedback mechanisms that regulate bodily functions.

Standard of Excellence

Students who achieved the *standard of excellence* on the Science 30 diploma examinations (11.4%) had little difficulty solving problems, whether they were presented in a straightforward statement or embedded in a context. The interpretation of electrical circuits presented little difficulty. Many of the students in this group solved titration problems and mass-to-energy conversions, balanced nuclear equations, and applied Hesse's Law to combustion reactions. Genetics and the inter-relationships among the body systems were well understood.

Students who achieved the *standard of excellence* were able to critically analyze scientific studies, including the associated charts, graphs, and conclusions. These students were aware of a variety of viewpoints relating to the environmental and ethical issues in the field of science and technology. They clearly expressed their opinions about these issues.

Do the population and performance data reveal any significant trends?

Some trends are apparent from field test data and the 1997–98 examinations. Students' ability to recognize the sources and effects of pollution continues to improve. Students who wrote the examinations in 1997–98 were very successful with this type of question.

Students have shown a steady improvement in communication skills from the first field tests in 1994 to the written-response questions on the June 1998 diploma examinations. The majority of students are now able to ascertain what the question is asking and can present a well-organized answer that contains specific examples to support their opinions.

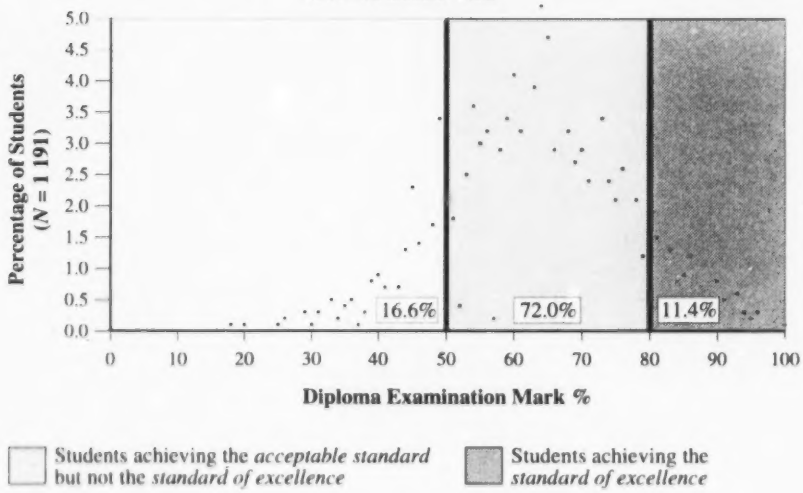
Students continue to experience difficulty in writing about major technologies from the STS component of the course. They also have difficulty with multistep problems, genetic-inheritance calculations, and the interpretation of electrical circuit diagrams.

It is expected that responses to questions that require a student to design or interpret a scientific study will improve as students experience these types of questions in the classroom and on future diploma examinations.

The number of students writing the Science 30 diploma examination increased from 1996–97 to 1997–98. It is hoped that a trend of increasing enrollment will continue, given the high regard that NAIT, SAIT, and other post-secondary institutions have shown for the program.

Figure 7-11

Science 30
Distribution of Diploma Examination Marks
1997–98 School Year



Appendix A

Diploma Examination Development Process

The staff of the Student Evaluation Branch give great care and attention to the development and marking of all diploma examinations to ensure that students' marks on diploma examinations are fair and equitable measures of their achievement.

Professional staff of the Student Evaluation Branch work with many individuals in the complex process of developing diploma examinations. Classroom teachers, school and jurisdiction administrators, representatives from post-secondary institutions, and staff of the Curriculum Standards Branch and Language Services Branch are all involved.

It takes approximately 18 months to complete the development of a diploma examination. The examination development process follows these steps:

- Planning
- Approving Examination Blueprints
- Developing Examination Questions
- Constructing and Administering Field Tests
- Analyzing and Revising Questions
- Constructing the Examinations
- Approving the Examinations
- Printing and Administering the Examinations
- Marking the Examinations
- Analyzing and Reporting the Results

Planning

The first step in the planning phase is to prepare (under direction from the Curriculum Standards Branch) specifications based on the goals and objectives of the curriculum for each subject.

Examination developers in each diploma examination course then prepare an interim examination blueprint. An examination blueprint is an overall plan used to guide the development of an examination. If a diploma examination is undergoing extensive revision because of curricular change, or if a new examination is to be developed, an advisory committee of teachers and subject consultants will contribute to decisions about the emphasis and design of the examination.

As blueprints are drafted and examinations are designed, examination developers and advisory committees must address these questions:

- What knowledge and skills can students be expected to possess?
- How can the various parts of the curriculum best be tested?
- What should be the weighting for each part of the curriculum tested?
- How long and how demanding should the examination be?
- What format will produce the most valid results?
- What types of questions will be most valid and reliable? (Multiple choice, short answer, numerical response, extended written response?)
- How should the examination be organized to produce valid and reliable results?
- How will students' responses be scored? What will the criteria be for scoring?
- How should the results be reported?
- Who will receive the results?

To ensure that each examination is a fair and equitable measure of students' accomplishments in the course, and to ensure that results will be meaningful and reliable, examination developers incorporate curricular as well as statistical standards into the examination design.

Examination questions are developed to reflect the range of expectations for students' achievement that is embedded in the curriculum. Each question is classified and cross-referenced to the curriculum in terms of the specified knowledge, skills, and understanding that the question is designed to assess. The range of difficulty embedded in the curriculum dictates the range of difficulty of examination questions.

Field testing confirms and validates the curricular expectations as reflected by the questions. Item analysis of the machine-scorable field-tested questions provides technical data about the relative difficulty of questions and about the technical strength of sets of questions. Field-tested questions are kept for use on a diploma examination or are re-field-tested to ensure that they meet appropriate technical and curricular standards, or such questions are discarded.

Approving Examination Blueprints

When examination developers and their advisory committees have developed an examination design and blueprint, including criteria for scoring written responses, a committee of Alberta Education staff (Regional Offices of Alberta Education, the Curriculum Standards Branch, Language Services Branch, and the Student Evaluation Branch) review the proposed design. The blueprint and design the committee recommends are then reviewed by an Examination Advisory Committee consisting of representatives nominated by the Alberta Teachers' Association, the Conference of Alberta School Superintendents, the Universities Co-ordinating Council, the Public Colleges of Alberta, Alberta Education, and representatives from business, industry, and other professional organizations and non-government agencies. This committee makes recommendations regarding the final examination design to the Director of the Student Evaluation Branch.

Developing Examination Questions

Following approval of the examination design, format, and blueprints, examination developers plan for question development. On the recommendations of superintendents, classroom teachers from across the province are selected to work on question development committees chaired by examination developers from the Student Evaluation Branch.

Professional examination development staff of the Student Evaluation Branch ensure that teachers serving on question development committees understand the technical principles of question construction. The teacher committees develop questions that meet the curricular and technical standards incorporated in the examination design and blueprints, and that will fairly test the skills and concepts that students can be expected to have acquired.

Questions developed in committee are then carefully screened, edited, and revised so that all blueprint requirements and technical standards are met. At this point, copyright approval is sought for testing materials such as literary selections, cartoons, graphs, maps, charts, and data sets.

Constructing and Administering Field Tests

Examination developers at the Student Evaluation Branch construct field tests containing questions developed by the teacher committees. Each field test is carefully edited and revised to ensure technical and curricular validity, and faithfulness to the examination blueprint. School jurisdiction personnel grant permission for the administration of field tests to students in their systems in January and/or June of each school year.

Based on the geographic and demographic variables expected for the total population that will write a given diploma examination, the Student Evaluation Branch field-testing administration staff selects a minimum sample of 250 students to write each field test. Field tests are administered only to students who are nearing completion of the diploma examination subject being tested so that their performances on the field test will be predictive of the performances of students writing the diploma examination.

Student Evaluation Branch professional staff members administer the field tests under secured examination conditions. This procedure allows examination developers to receive first-hand information from teachers and students about examination questions and formats. As well, the procedure ensures test security and uniform administration conditions so that statistical results can be considered reliable.

Teachers whose classes participate in field testing comment on:

- level of difficulty of questions
- curricular validity
- appropriateness of questions, data sets, reading selections, format
- problems with questions, stimulus material, art work
- clarity of instructions
- correspondence between questions and the way in which a concept is taught

Students are also encouraged to discuss the field test with the field test administrator.

All of the data from field testing—statistical and anecdotal—provide the examination developer with accurate and first-hand information that is used to ensure that the final form of each diploma examination is a valid and reliable measure of students' achievement.

Analyzing and Revising Questions

Examination developers carefully analyze the statistical results and teacher comments for each field test to determine the need for additional field testing. Individual questions or question sets requiring changes are revised and submitted for further field testing. If changes are not feasible, questions are discarded.

Questions and question sets that prove successful in field testing are considered for inclusion in a diploma examination.

Constructing the Examinations

The diploma examinations are composed of questions and/or question sets that have proven to be valid in field testing. For each diploma subject, parallel examinations are developed annually for administration in January, June, and August. For some diploma subjects, a parallel examination is also administered in April or November. The examinations are designed to be parallel in form and equivalent in difficulty. Each examination is constructed according to the approved blueprint (i.e., each will have approximately the same number of questions testing a

particular facet of the curriculum as specified by the blueprint). An information bulletin outlining the design, format, and marking criteria for each diploma examination subject is distributed to schools at the beginning of each school year. The information bulletins include changes from previous years' examinations and scoring guides.

Approving the Examinations

Once a final form of a diploma examination is drafted, it receives editing, proofreading, and technical checking. The examination developers from the Student Evaluation Branch present the final form of each examination to an Alberta Education committee that gives the examination a thorough technical review.

The recommendations of the Alberta Education committee are incorporated into any additional revisions that are necessary.

The Examination Advisory Committee also meets each administration to review the results of the past year's examinations and to advise on policy issues that affect the design, development, and administration of the examinations, and the reporting and interpretation of the results.

Printing and Administering the Examinations

Following the Director's approval of the final form of a diploma examination, examination developers ensure completion of additional quality checks that include editing, proofreading, validating of correct answers by a teacher committee, checking print quality of art work and illustrations, confirming precise match to the blueprint, and completing a final estimate of difficulty for each question.

Each examination is printed and then distributed to schools just before the administration dates.

Schools are responsible for ensuring the security of examinations before administration and for ensuring that examinations are administered according to regulations. Each school receives extra copies of the January and June examinations for use in the school.

Diploma examinations are scheduled annually in November, January, April, June, and August, and are conducted according to examination regulations. Schedules and regulations are published in the *General Information Bulletin* that is distributed to schools each fall.

The November, April, and August examinations are secured.

Students identified as having special diploma examination writing needs may apply for special provisions for examination writing. Special provisions include braille examinations, large-print examinations, audiotape examinations, use of a tape recorder for responses, use of a scribe, and use of a sign-language translator. The complete policy for special provisions is printed in the *General Information Bulletin* and is available on request from the Student Evaluation Branch (telephone 780-427-0010). Following administration, completed examinations are shipped (in accordance with security regulations) to Alberta Education in Edmonton for processing and marking.

Marking the Examinations

Markers for the written-response parts of the examinations are teachers nominated by their superintendents and selected on a proportional basis so that the percentage of markers selected from a geographic area is comparable with the percentage of papers from that area. To be selected for marking, a teacher must be currently teaching the subject he or she wishes to mark, must have taught the course for at least two years, and must possess a valid Alberta Permanent Professional Teaching Certificate.

Selected classroom teachers are trained in marking procedures and are supervised during the marking session by the professional staff from the Student Evaluation Branch.

The written-response parts of the diploma examinations are all marked centrally. All student and school identification is removed from the papers before the marking so that markers have no means of knowing the source of a paper. Multiple-choice and numerical-response questions are computer-scored.

Analyzing and Reporting the Results

The statistical results of each examination are carefully analyzed. The Examination Advisory Committee may be asked to review the results as well. Reports of local results in each subject are prepared for all school jurisdictions.

Individual student results are mailed about one month after the date on which the examinations were administered. Students who are dissatisfied with their results in any subject may request that their examination in that subject be rescored. The fee for rescoring, including GST, is $26.75 per examination. The mark awarded after the rescoring supersedes the initial mark.

Appendix B

Guidelines for Interpreting and Using the Results of the Diploma Examinations

Purpose of the Reports

The jurisdiction and school reports describe the results achieved by students who wrote diploma examinations in this administration and who had a school-awarded mark. If requested by the superintendent, similar reports for instructional groups in the school are also provided. The figures reported do not reflect the results of appeals of school-awarded marks, rereads of diploma examinations, or consideration of special cases. Alberta Education does not endorse the publication of rank order lists of results.

Alberta Education, school authorities, and schools are responsible for ensuring that the highest possible quality of education is provided for students. The results from provincial assessments allow the government, provincial officials, school board members, superintendents, principals, teachers, school councils, parents, and community members to examine results in relation to provincial goals and standards.

Results from diploma examinations provide information that can help identify areas of strength, areas needing improvement, and the progress being made toward the achievement of goals. The careful interpretation of results from diploma examinations informs decisions about how to improve student learning.

As noted in the *Guide for School Board Planning and Reporting*, reporting on the results achieved is one of the keys to establishing processes that lead to continuous improvements to education.

Diploma examination results provide only part of the overall picture of the province's, a school jurisdiction's, or a school's performance. Although provincial assessments are designed to assess the achievement of provincial standards as reflected in the Program of Studies, many important learning outcomes cannot be measured by time-limited, paper-and-pencil tests. In addition, many factors contribute to student achievement. The analysis, interpretation, use, and communication of results from diploma examinations need to take these factors into account.

The school and jurisdiction are in the best position to accurately interpret, use, and communicate diploma examination results as they pertain to the school or jurisdiction. Wherever possible, information about a school's or jurisdiction's results should be obtained from the school or jurisdiction.

Considerations

1. Each school authority, in collaboration with its community, is expected to use the results from diploma examinations for its jurisdiction together with data from other performance measures to plan improvements in performance of the school jurisdiction. The school authority is expected to report annually to the parents and taxpayers in the jurisdiction the results for the jurisdiction on provincial assessments. (See *Guide for School Board Planning and Reporting* for complete requirements.)

2. The school principal and teachers, in collaboration with parents and the community, are expected to use their school results on diploma examinations together with data from other performance measures to plan improvements in the performance of the students. They are expected to report the school's results on provincial assessments annually to the parents of students in the school, the school council, and to taxpayers in the school's community. In most cases, reporting results after each administration does not give an accurate picture of school or jurisdiction results.

3. Results on provincial assessments for individual students and for groups of fewer than five students shall not be publicly released. Although parents, community members, and taxpayers have the right to know how well schools, school jurisdictions, and the province are performing, the right to privacy of the individual student must be ensured. When there are few students writing a diploma examination at one administration, consideration should be given to reporting annual results only. Annual results together with results for the last four years are provided by Alberta Education.

4. Results from provincial assessments can assist teachers in their assessment of their own instructional practice and can assist others in the review of a teacher's instructional practice; however, results from provincial assessments shall not be used as the sole basis for evaluating teacher performance. The performance of students on provincial assessments is the result of several years in school as well as other variables, and cannot be solely attributed to one teacher.

5. School jurisdiction and school results on provincial assessments should be communicated together with provincial results and standards, all of the other measures that provide indications of a school's or a jurisdiction's performance, local targets, the contexts for learning, and plans for improvement.

6. When comparisons are made against provincial standards and results, interpretations should take into account local targets, contexts, and plans.

7. Interpreting and communicating the results for small groups of students should be done in the awareness that the trends for small groups of students can be greatly influenced by the scores of one or two students. Instructional Group Reports for fewer than five students are not to be made public.

8. The analysis, interpretation, use, and communication of results on diploma examinations should consider the limitations of provincial assessments and adhere to the *Principles of Fair Student Assessment Practices for Education in Canada.*

9. School-awarded marks and diploma

examination marks are complementary measures. School-awarded marks should reflect all aspects of learning in a course, including those that cannot be measured by time-limited, paper-and-pencil tests. Although differences can be expected between a student's school-awarded mark and that student's diploma examination mark in a course, large differences between school-awarded marks and diploma examination results for groups of students should be investigated. Final course mark distributions cannot be directly compared to school-awarded mark distributions or to diploma examination mark distributions, as the final mark is not independent of the other two marks.

10. Factors affecting student selection of diploma examination courses vary from school to school. These factors should be considered when comparing school or jurisidiction results with provincial results. The participation rates provided annually as part of the annual multiyear summary report should be used when interpreting or communicating the diploma examination results.

11. Some information about changes in student performance on diploma examinations from year to year can be derived by comparing the local percentage of students achieving standards to the provincial results in each of the years of interest. Direct comparison of percentages of students meeting standards or averages for a school or jurisdiction from year to year does not provide reliable information on changes in student performance. Changes in curriculum and standards over time affect the results. The diploma examinations are designed to be parallel in a given year but not necessarily across years.

School Factors That Affect Student Achievement

Research in education has identified key aspects of school effectiveness that affect student achievement.

1. Productive School Climate and Culture
   - There is a shared and articulated focus on achievement.
   - There is a shared belief that all students can achieve.
   - Staff is cohesive, collaborates, and makes decisions by consensus.

2. Focus on Student Acquisition of Central Learning Skills
   - Teachers know what students are to learn and emphasize mastery of key concepts.
   - Students know what is expected of them.
   - Learning time is maximized.

3. Appropriate Monitoring of Student Progress
   - Student progress is monitored, reported, and used for planning improvements.
   - Students can show what they have learned.
   - Parents know what their child has achieved.

4. Outstanding Leadership
   - Effective instructional leadership is provided.

5. Parent Involvement
   - High levels of school and home cooperation are evident.

6. Effective Instruction
   - Grouping and organizational arrangements are appropriate.
   - Pacing is appropriate.
   - Curriculum and learning are aligned.
   - Teachers use a variety of strategies.
   - Students are actively involved.

7. High Expectations and Requirements for Students
   - Students are held responsible for learning.
   - Higher-order learning is emphasized.

Many other factors can be considered in interpreting results and planning for improved learning. These include students' abilities, attitudes, motivations, aspirations, academic backgrounds, and learning styles. They also include students' family circumstances, socioeconomic backgrounds, and community environments.

A Systematic Approach for the Effective Use of Diploma Examination Results

The interpretation and analysis of diploma examinations should be a collaborative effort that can involve teachers, students, parents and the community. A systematic use of diploma examination results might include the following steps:

1. Comparing test results for a school or instructional group with the provincial results. Be sure that your comparisons include the:
   - total test score
   - total on machine-scored and written-response questions
   - subscale scores for machine-scored and written-response questions
   - individual machine-scored and written-response question results
   - differences between school-awarded and diploma examination marks
   - participation rates in each course

2. Noting any patterns, anomalies, and/or interrelationships in the results.

3. Hypothesizing relationships between your observations and the factors that have an effect on achievement.

4. Developing and implementing a plan to improve the quality of education for students.

5. Developing and implementing a communication plan to share results and what the school is planning to do to improve student learning.

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February 1999

Appendix C
Percentage Distribution of Marks in Diploma Examination Courses

Percentage Distribution of Marks in Diploma Examination Courses

Diploma Examination Course	January 1998* School-Awarded Mark	Diploma Examination Mark	Final Course Mark	*January 1997 Final Course Mark*
ENGLISH 30			***N** = 9 736*	***N* = 9 765**
A (80-100%)	20.1	13.6	14.2	13.4
B (65-79%)	44.8	35.5	42.9	43.0
C (50-64%)	29.9	38.7	39.2	39.8
F (0-49%)	5.2	12.2	3.7	3.8
Mean	68.5	64.5	67.0	66.7
Standard Deviation	12.2	13.0	11.2	11.2
ENGLISH 33			***N* = 5 607**	***N* = 5 831**
A (80-100%)	6.0	7.2	4.6	4.5
B (65-79%)	35.0	40.2	38.7	39.4
C (50-64%)	46.8	40.0	50.9	49.8
F (0-49%)	12.2	12.6	5.8	6.3
Mean	61.3	63.3	62.8	62.9
Standard Deviation	11.7	11.5	9.8	10.0
FRANÇAIS 30*			***N* = 35**	***N* = 22**
A (80-100%)	n/a	n/a	n/a	n/a
B (65-79%)	n/a	n/a	n/a	n/a
C (50-64%)	n/a	n/a	n/a	n/a
F (0-49%)	n/a	n/a	n/a	n/a
Mean	n/a	n/a	n/a	n/a
Standard Deviation	n/a	n/a	n/a	n/a
SOCIAL STUDIES 30			***N* = 7 967**	***N* = 7 801**
A (80-100%)	21.5	16.6	17.6	16.6
B (65-79%)	42.0	32.1	37.0	40.3
C (50-64%)	32.8	33.5	39.7	38.6
F (0-49%)	3.7	17.8	5.7	4.5
Mean	68.8	63.8	66.6	67.1
Standard Deviation	11.8	14.8	12.4	11.8
SOCIAL STUDIES 33			***N* = 5 828**	***N* = 5 761**
A (80-100%)	5.9	11.2	5.8	3.9
B (65-79%)	35.0	37.3	38.4	33.7
C (50-64%)	48.6	35.2	47.6	51.8
F (0-49%)	10.5	16.3	8.2	10.6
Mean	61.7	63.3	62.8	61.0
Standard Deviation	11.2	13.4	10.8	10.7

** The figures may change slightly as a result of appeals of school-awarded marks, rereads of diploma examinations, or special cases considerations.*

*** The January 1998 results for Français 30 are not reported because only 35 students received final course marks.*

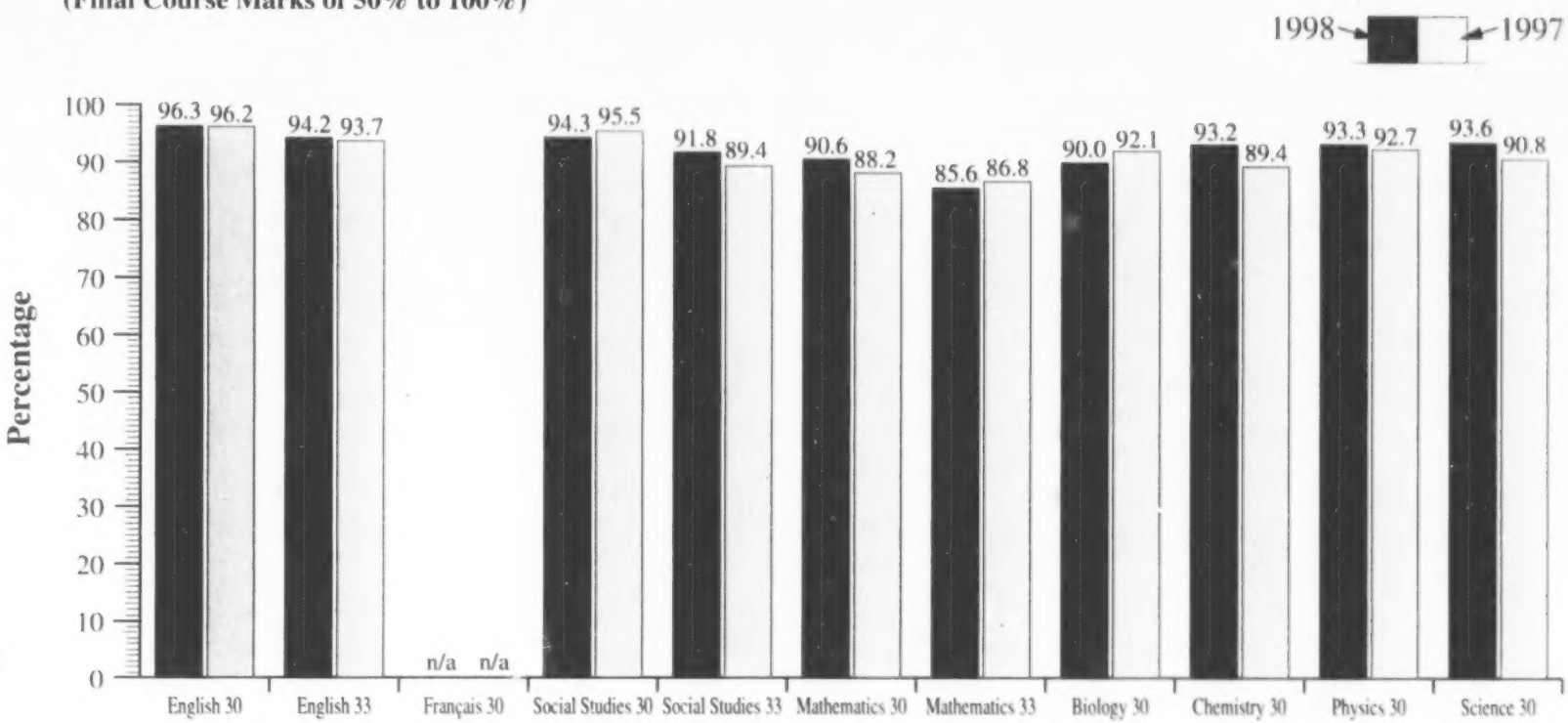
Diploma Examination Course	January 1998* School-Awarded Mark	Diploma Examination Mark	Final Course Mark	January 1997 Final Course Mark
MATHEMATICS 30			**N* = 9 741**	**N = 9 470**
A (80-100%)	26.6	24.4	24.5	20.6
B (65-79%)	35.7	30.8	34.2	33.7
C (50-64%)	30.0	26.8	31.9	33.9
F (0-49%)	7.7	18.0	9.4	11.8
Mean	69.0	66.0	67.8	66.0
Standard Deviation	14.1	17.0	14.7	14.9
MATHEMATICS 33			**N = 5 581**	**N = 5 634**
A (80-100%)	14.8	12.2	11.4	13.1
B (65-79%)	34.2	30.6	35.1	35.6
C (50-64%)	36.8	34.3	39.1	38.1
F (0-49%)	14.2	22.9	14.4	13.2
Mean	63.6	61.2	62.8	63.6
Standard Deviation	13.9	15.2	13.5	13.8
BIOLOGY 30			**N = 7 354**	**N = 7 687**
A (80-100%)	25.3	18.8	21.1	22.3
B (65-79%)	38.4	29.7	34.1	34.7
C (50-64%)	30.0	29.3	34.8	35.1
F (0-49%)	6.3	22.2	10.0	7.9
Mean	69.1	63.4	66.5	67.3
Standard Deviation	13.3	16.6	14.2	14.0
CHEMISTRY 30			**N = 6 892**	**N = 6 950**
A (80-100%)	24.5	20.4	20.8	18.6
B (65-79%)	38.8	34.6	38.9	34.8
C (50-64%)	29.8	30.6	33.5	36.0
F (0-49%)	6.9	14.4	6.8	10.6
Mean	68.8	65.9	67.7	65.7
Standard Deviation	13.3	15.1	13.3	14.0
PHYSICS 30			**N = 3 268**	**N = 3 099**
A (80-100%)	27.4	29.3	26.9	25.6
B (65-79%)	39.8	32.0	38.3	37.7
C (50-64%)	27.1	24.4	28.1	29.4
F (0-49%)	5.7	14.3	6.7	7.3
Mean	70.1	68.2	69.6	69.0
Standard Deviation	13.3	16.8	14.1	14.2
SCIENCE 30			**N = 361**	**N = 357**
A (80-100%)	10.2	16.1	11.9	8.4
B (65-79%)	36.8	33.5	37.4	35.6
C (50-64%)	41.6	38.2	44.3	46.8
F (0-49%)	11.4	12.2	6.4	9.2
Mean	63.6	65.4	65.1	63.0
Standard Deviation	11.5	13.5	11.6	11.8

** The figures may change slightly as a result of appeals of school-awarded marks, rereads of diploma examinations, or special cases considerations.*

Diploma Examination Courses
Final Course Marks

January 1998 and January 1997

Percentage of Students Achieving Acceptable Standard
(Final Course Marks of 50% to 100%)

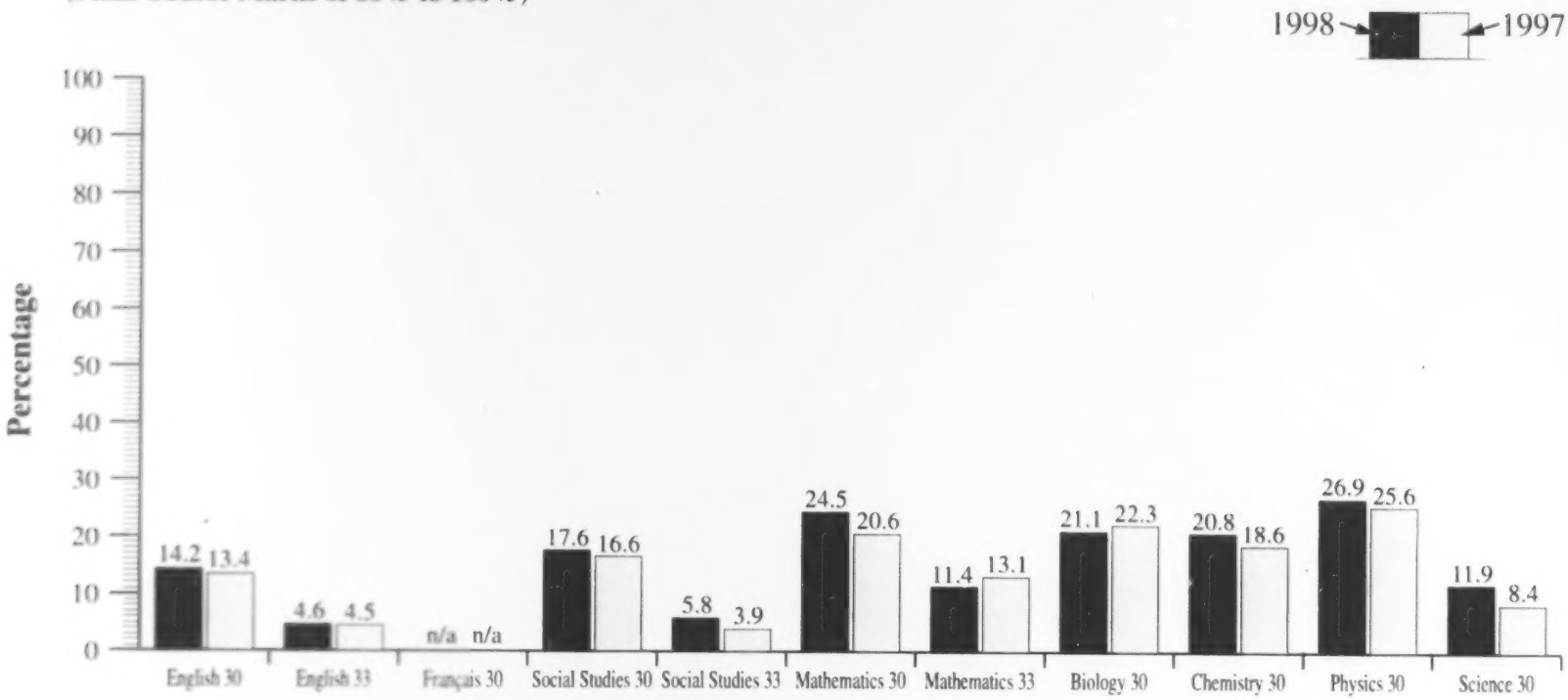


†The January 1998 results for Français 30 are not reported because only 35 students received final course marks.

Diploma Examination Courses
Final Course Marks

January 1998 and January 1997

Percentage of Students Achieving Standard of Excellence
(Final Course Marks of 80% to 100%)



[1]The January 1998 results for Français 30 are not reported because only 35 students received final course marks.

Percentage Distribution of Marks in Diploma Examination Courses

Diploma Examination Course	June 1998 School-Awarded Mark	June 1998 Diploma Examination Mark	June 1998 Final Course Mark	*June 1997 Final Course Mark*
ENGLISH 30			***N**= 12 343	***N* = 12 163**
A (80-100%)	23.2	14.0	**16.0**	15.1
B (65-79%)	41.6	34.3	**40.3**	41.3
C (50-64%)	29.4	38.2	**38.8**	39.1
F (0-49%)	5.8	13.5	**4.9**	4.5
Mean	68.7	64.2	**66.8**	66.8
Standard Deviation	12.9	13.4	**11.8**	11.7
ENGLISH 33			***N* = 6 478**	***N* = 6 796**
A (80-100%)	6.0	7.7	**4.1**	4.1
B (65-79%)	33.6	40.3	**38.6**	37.1
C (50-64%)	46.2	38.0	**49.6**	50.3
F (0-49%)	14.2	14.0	**7.7**	8.5
Mean	60.6	63.2	**62.4**	62.0
Standard Deviation	12.2	12.1	**10.2**	10.3
FRANÇAIS 30			***N* = 76**	***N* = 64**
A (80-100%)	21.1	9.2	**10.5**	15.6
B (65-79%)	46.1	42.1	**55.3**	43.8
C (50-64%)	28.9	44.8	**32.9**	37.5
F (0-49%)	3.9	3.9	**1.3**	3.1
Mean	70.6	66.0	**68.6**	68.0
Standard Deviation	11.4	10.0	**9.1**	10.5
SOCIAL STUDIES 30			***N* = 10 203**	***N* = 10 508**
A (80-100%)	24.8	15.9	**18.1**	17.4
B (65-79%)	40.6	34.0	**38.4**	37.0
C (50-64%)	30.3	33.6	**38.2**	39.2
F (0-49%)	4.3	16.5	**5.3**	6.4
Mean	69.5	64.3	**67.2**	66.4
Standard Deviation	12.3	14.4	**12.4**	12.6
SOCIAL STUDIES 33			***N* = 7 345**	***N* = 7 357**
A (80-100%)	6.5	7.6	**4.8**	4.1
B (65-79%)	34.0	35.8	**36.2**	34.6
C (50-64%)	46.3	38.5	**48.5**	49.8
F (0-49%)	13.2	18.1	**10.5**	11.5
Mean	61.1	61.5	**61.7**	61.1
Standard Deviation	12.0	13.1	**10.9**	11.0

**N* = the number of Alberta students who have both a school-awarded mark and a current diploma examination mark.

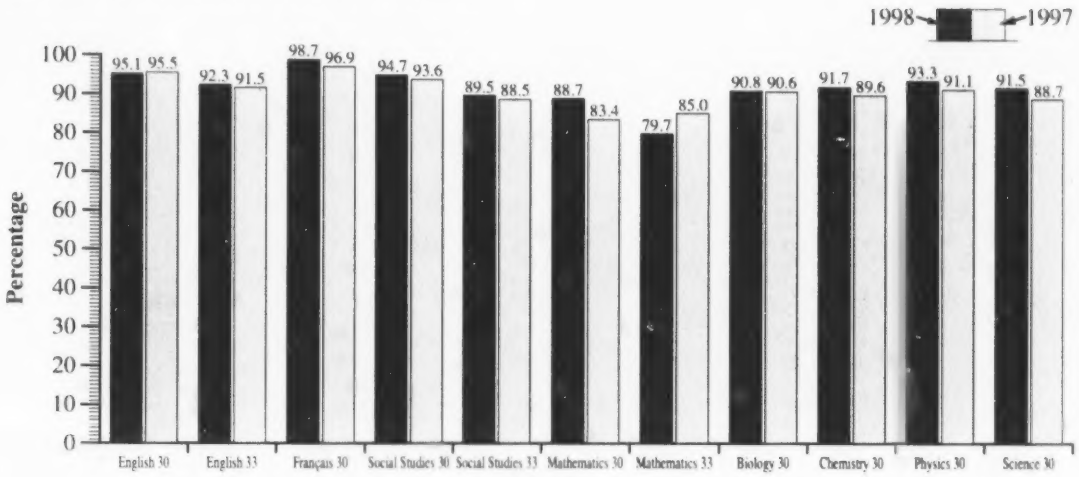
Diploma Examination Course	June 1998 School-Awarded Mark	June 1998 Diploma Examination Mark	June 1998 Final Course Mark	June 1997 Final Course Mark
MATHEMATICS 30			**N*= 8 432**	**N = 8 719**
A (80-100%)	24.6	19.7	**20.5**	18.3
B (65-79%)	33.7	28.6	**32.4**	28.0
C (50-64%)	32.1	29.9	**35.8**	37.1
F (0-49%)	9.6	21.8	**11.3**	16.6
Mean	67.6	63.5	**65.9**	63.5
Standard Deviation	14.9	17.1	**15.0**	15.9
MATHEMATICS 33			**N = 5 818**	**N = 5 645**
A (80-100%)	13.6	10.1	**10.0**	13.6
B (65-79%)	30.4	23.3	**28.2**	32.5
C (50-64%)	38.5	34.2	**41.5**	38.9
F (0-49%)	17.5	32.4	**20.3**	15.0
Mean	61.9	57.2	**60.0**	62.9
Standard Deviation	14.7	16.7	**14.5**	14.3
BIOLOGY 30			**N = 8 813**	**N = 9 022**
A (80-100%)	28.2	29.4	**27.7**	25.1
B (65-79%)	36.0	26.8	**32.4**	33.4
C (50-64%)	29.5	25.3	**30.7**	32.1
F (0-49%)	6.3	18.5	**9.2**	9.4
Mean	69.6	67.2	**68.7**	68.0
Standard Deviation	13.7	18.0	**15.1**	14.7
CHEMISTRY 30			**N = 8 004**	**N = 8 141**
A (80-100%)	27.0	18.4	**21.5**	20.5
B (65-79%)	36.8	35.1	**38.0**	34.8
C (50-64%)	28.0	31.5	**32.2**	34.3
F (0-49%)	8.2	15.0	**8.3**	10.4
Mean	69.0	65.3	**67.5**	66.4
Standard Deviation	14.2	15.0	**13.8**	14.6
PHYSICS 30			**N = 5 183**	**N = 5 128**
A (80-100%)	35.5	29.0	**30.4**	23.0
B (65-79%)	37.0	32.3	**36.9**	36.2
C (50-64%)	22.3	23.9	**26.0**	31.9
F (0-49%)	5.2	14.8	**6.7**	8.9
Mean	72.3	68.1	**70.5**	67.7
Standard Deviation	14.0	16.7	**14.4**	14.4
SCIENCE 30			**N = 811**	**N = 720**
A (80-100%)	9.4	9.5	**7.5**	5.7
B (65-79%)	34.6	32.1	**35.6**	35.0
C (50-64%)	46.1	39.7	**48.4**	48.0
F (0-49%)	9.9	18.7	**8.5**	11.3
Mean	63.0	61.7	**62.7**	61.6
Standard Deviation	11.4	13.1	**11.1**	11.2

*N = the number of Alberta students who have both a school-awarded mark and a current diploma examination mark.

Diploma Examination Courses
Final Course Marks

June 1998 and June 1997

Percentage of Students Achieving Acceptable Standard
(Final Course Marks of 50% to 100%)



Percentage of Students Achieving Standard of Excellence
(Final Course Marks of 80% to 100%)